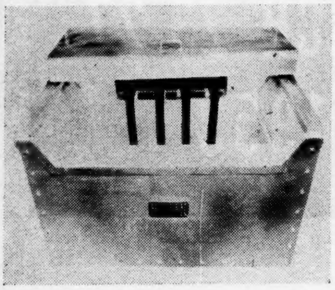
metal

the news digest magazine

Volume XXVI - No. 1 January, 1953



Electrode Furnace; Descaling-Carburizing-Hardening-Tempering.

HOLDEN SALT BATHS AND FURNACES

Heat treating in molten salt has in recent years increased considerably so that today it is firmly established as a method of heat treating having certain very definite advantages. Usually applied to small parts, the salt bath heats rapidly and with absolute uniformity.

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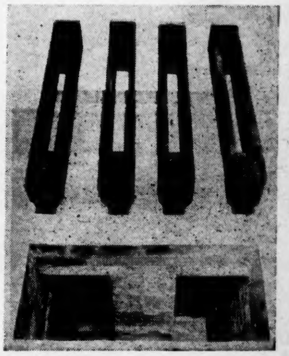
For light and deep case hardening on all kinds of parts, such as gears, pressings and dies. Case depths up to .060". Parts easily cleaned in water after carburizing.



Type 701 Electrode Furnace with ceramic pot for neutral hardening and annealing 1000-2300° F.

CARBON AND STEEL HARDENING BATHS

For hardening, without scaling or decarburization, carbon and alloy steels 1000°F.-2000°F. including air hardening die steels.

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Investigate the new neutral baths: Hardening 185-10; High Speed 17-24AA-10; High Speed Preheat 13-17-10; Hard Brite AA-10. These salt baths increase life of both electrode furnaces and alloy pots.

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For the secondary treatment of high speed steel tools to increase working life. Increase in tool life generally 100% or more.

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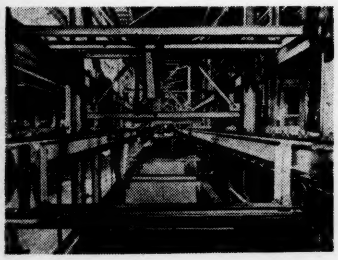
For carbon alloy and high speed steels without scaling. Working range 300°F.-1100°F.



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TYPE 701 ELECTRODE FURNACE

The Type 701 Submerged Electrode Furnace reduces radiation losses by 33-1/3%. This design can be used to replace any existing furnace with a ceramic pot, using a transformer with two, four or six electrodes. Operating temperatures 1000°F.-2300°F., with neutral salt baths.

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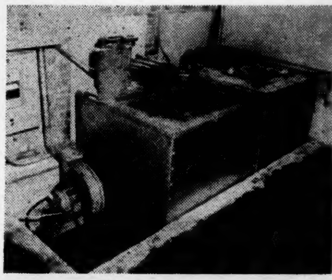

Hardening and Austempering Unit for lawn mower blades and other martempering and austempering applications; production from 300 to 1000# per hour depending on rated capacities.

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IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

Western Metal Congress and Exposition
Los Angeles, March 23–27, 1953

Enlarged beyond original plans, the Western Metal Exposition, Mar. 23-27 in Los Angeles, has attained standards and dimensions which make it the largest and most important display of metals and machinery yet blueprinted for the Pacific Coast.

Committees in charge made this statement with the declaration that 271 firms have entered exhibits. So many concerns are in the show that the exposition will be held under two roofs—Pan-Pacific auditorium, and the adjacent Pan-Pacific Pavilion, to be connected with runways. On the same dates technical sessions of the Western Metal Congress will take place in Los Angeles' new Statler Hotel. (See tentative schedule, p. 5).

"Faster and better production with less outlay of capital" will be the theme of many displays, said William H. Eisenman, A.S.M. national secretary, now in Los Angeles to operate the combined exposition and congress.

A show feature will be a large display of machine tools made in Great Britain, Switzerland, Norway, Sweden, Austria, France, Italy and Japan. Lathes, boring mills, jig borers, radial drills, tool grinders, milling machines, chucks and centers will be shown in operation.

Metals, machinery, metal fabricating equipment and methods, as well as equipment for research, testing, inspection, heat treating, welding, cutting and otherwise handling metals will be seen throughout the exposition. All features will combine in delivering an economic message to industry.

Many of the country's best technical engineers will be stationed in displays, to undertake solutions of industrial problems by new approaches, utilization of better metals and machinery or advanced techniques.

Twenty-one western divisions of national technical societies are cooperating with the American Society for Metals in sponsoring the exposition and congress. Six of the societies will present technical sessions during the five-day meetings. These are American Society for Metals, American Welding Society, Society for Non-Destructive Testing, American Society for Testing Materials, American Foundrymen's Society, and American Institute of Mining and Metallurgical Engineers.

Other societies' western sections which are cooperating along other lines are: American Society of Mechanical Engineers—Southern California section, American Society of Tool Engineers, Institute of the Aeronautical Sciences—Los Angeles section, Army Ordnance Association—Army Post, and the Purchasing Agents Association of Los Angeles, American Society of Heating and Ventilating Engineers, American Electroplaters Society, the Society of Automotive Engineers, the California Society of Professional Engineers, American Society of Civil Engineers, Structural Engineers Association of Southern California, American Society of Safety Engineers, American Ceramic Society, Pacific Coast Gas Association and American Society of Refrigeration Engineers.

A.S.M. Congress sessions will be devoted to titanium, zirconium, aluminum, magnesium and other alloying materials.

Information on zirconium was obtained under special projects of the Atomic Energy Commission. For a time it was kept under wraps, and only recently the commission lifted its restriction and asked A.S.M. to make the zirconium data available to all industry.

All types of welding for aircraft, rockets, guided missiles and other applications—including gas, arc, spot, seam and fusion welding—will be discussed at sessions of the American Welding Society.

S.N.T. and A.S.T.M. technical sessions will cover recent developments in X-ray, electronic, supersonic, electronmicroscopic, and other testing methods. Latest techniques for casting ferrous and nonferrous materials will be described at A.F.S. meetings.

For the first time in the west, aisles of the metal show will have crimson carpeting. The floor covering will be backed by foam rubber to eliminate shock-impacts when walking the aisles.

The walls of the exposition will be hung with enlarged art depictions of American aviation history. The pictorial display will range from the Wright Brothers' first flight to the present supersonic age. An industrial theater will show films on late developments in machining, testing and producing, fabricating and applying metals.

The exposition gates will admit without charge those who show membership cards of cooperating societies or special invitations issued by exhibitors. Others may enter by paying a registration fee of $1. Congress sessions will be open to everyone.

Long-Time A.S.M. Member Returns to Austria

Victor Tlach, who helped organize the New York Chapter A.S.M. in 1918, and who has been a member of the Cleveland Chapter for the past several years, has left the United States to return to his native country, Austria, for an indefinite stay.

Rhode Islanders Enjoy Annual Fall Outing

Almost the Entire Membership of the Rhode Island Chapter of the American Society for Metals Enjoyed the Annual Fall Outing Which Preceded the 1952-53 Series of Technical Meetings, As Evidenced Above

American Society for Metals

Tentative Technical Program of
Western Metal Congress
Los Angeles—March 23-27, 1953
All Sessions in Golden State Room
Statler Hotel

Monday, March 23

9:00 a. m.

TITANIUM

Mechanical Properties and Strain Aging Effects in Titanium, by F. D. Rosi and F. C. Perkins, Sylvania Electric Products, Inc.

The Influence of Insoluble Phases on the Machinability of Titanium, by R. M. Goldhoff, H. L. Shaw, C. M. Craighead and R. I. Jaffee, Battelle Memorial Institute.

Mechanical Properties, Including Fatigue, of Titanium Base Alloys RC-130-B and Ti-150-A at Very Low Temperatures, by S. M. Bishop, J. W. Spretnak and M. G. Fontana, Ohio State University.

The Titanium-Oxygen System, by E. S. Bumps, Studebaker Corp., H. D. Kessler and M. Hansen, Armour Research Foundation.

The Martensite Transformation Temperature in Titanium Binary Alloys, by Pol Duwez, California Institute of Technology.

Isothermal Transformation of Titanium-Chromium Alloys, by P. D. Frost, W. M. Parris, L. L. Hirsch, J. R. Doig, and C. M. Schwartz, Battelle Memorial Institute.

Surface Hardening of Titanium by Carburizing and Induction Heat Treatment, by A. J. Griest, P. E. Moorhead, P. D. Frost, and J. H. Jackson, Battelle Memorial Institute.

Tuesday, March 24

9:00 a. m.

ZIRCONIUM
(Symposium)

Zirconium Ores (The Raw Material Supply and Concentration Methods) by O. C. Ralston, U. S. Bureau of Mines.

Manufacture of Zirconium Powder, by H. S. Kalish, Sylvania Electric Products, Inc.

Reduction by Electrolysis, by E. Wainer, Horizons, Inc.

Refining by Hot-Wire or Other Techniques, by W. M. Raynor, Foote Mineral Co.

Manufacture of Zirconium Sponge, by S. M. Shelton and E. D. Dilling, U. S. Bureau of Mines.

Consumable-Electrode Arc Melting of Zirconium Metal, by W. W. Stephens, H. L. Gilbert and R. A. Beall, U. S. Bureau of Mines.

Fabrication of Zirconium, by R. B. Gordon and W. J. Hurford, Westinghouse Electric Corp.

Tuesday, March 24

2:00 p. m.

RESEARCH

Effect of Carbon and Boron on the Hardenability of a Case-Carburized Steel, by R. A. Grange and J. B. Mitchell, U. S. Steel Co.

Properties of Some Hydrogen-Sintered, Binary Molybdenum Alloys, by W. L. Bruckart, M. H. LaChance, C. M. Craighead and R. I. Jaffee, Battelle Memorial Institute.

Effect of Alloying Elements on Grain Boundary Relaxation in Alpha Solid Solutions of Aluminum, by C. D. Starr, E. C. Vicars, A. Goldberg and J. E. Dorn, University of California.

Resistance of Cast Iron Nickel Chromium to Corrosion in Molten Heat Treating Salts, by J. H. Jackson and M. H. LaChance, Battelle Memorial Institute.

A Precipitation Hardening Cu-Ni-Si-Al Alloy, by B. B. Roach, R. B. Fischer and J. H. Jackson, Battelle Memorial Institute.

Wednesday, March 25

9:00 a. m.

ZIRCONIUM
(Symposium)

Effect of Hydrogen on the Embrittlement of Zirconium and Zirconium-Tin Alloys, by W. L. Mudge, Jr., Westinghouse Electric Corp.

Determination of Hydrogen in Zirconium by the Hot Vacuum Extraction Method, by R. K. McGeary, Westinghouse Electric Corp.

A Simplified Procedure for the Metallography of Zirconium and Hafnium and Their Alloys, by F. M. Cain, Jr. Westinghouse Electric Corp.

Recovery of Cold-Worked Zirconium, by W. A. Bostrom and S. A. Kulin, Westinghouse Electric Corp.

The Solid Solubility of Tin in Alpha-Zirconium, by G. R. Speich and S. A. Kulin, Westinghouse Electric Corp.

The System Zirconium-Silicon, by C. E. Lundin, D. J. McPherson and M. Hansen, Armour Research Foundation.

The System Zirconium-Tin, by D. J. McPherson and M. Hansen, Armour Research Foundation.

Wednesday, March 25

2:00 p. m.

RESEARCH

The Effect of Dispersions on the Tensile Properties of Aluminum-Copper Alloys, by R. B. Shaw, L. A. Shepard, C. D. Starr and J. E. Dorn, University of California.

Austenite Stability and Creep-Rupture Properties of 18-8 Stainless Steels, by J. K. Y. Hum, Bechtel International, and N. J. Grant, Massachusetts Institute of Technology.

Recrystallization of Wrought Hydrogen-Sintered Molybdenum and Its Alloys, by M. H. LaChance, W. L. Bruckart, C. M. Craighead and R. I. Jaffee, Battelle Memorial Institute.

A Study of the Mechanism of the Delayed Yield Phenomenon, by T. Vreeland, Jr., D. S. Wood and D. C. Clark, California Institute of Technology.

A Study of Factors Controlling Strength in the Torsion Test, by R. D. Olleman, E. T. Wessel and F. C. Hull, Westinghouse Electric Corp.

Thursday, March 26

9:00 a. m.

ZIRCONIUM
(Symposium)

Observations on the Alpha-Beta Phase Transformation of Zirconium, by E. E. Hayes, E. I. du Pont de Nemours & Co., and A. R. Kaufmann, Massachusetts Institute of Technology.

Some Properties of High-Purity Zirconium and Dilute Alloys with Oxygen, by R. M. Treco, Bridgeport Brass Co.

The Zirconium-Nickel Phase Diagram, by E. T. Hayes, A. H. Roberson and O. G. Paasche, U. S. Bureau of Mines.

Physical Metallurgy of Certain Binary Alloy Systems Such as Zr-N, Zr-O, Zr-Sn, by E. T. Hayes, U. S. Bureau of Mines.

General Comparison of the Metallurgy of Zirconium With That of Better-Known Commercial Metals, by Arthur D. Schwope, Battelle Memorial Insitute.

The Corrosion Resistance of Zirconium and Its Alloys, by L. B. Golden, U. S. Bureau of Mines.

Circuit Speakers Tour Pacific Northwestern Chapters

Last March, National Secretary Eisenman held a conference with the chapter officers of the five Pacific Northwest chapters (British Columbia, Oregon, Inland Empire, Columbia Basin, and Puget Sound). At his suggestion, to promote the obtaining of outstanding metals experts as monthly speakers in that territory, the chapter officers organized a "Pacific Northwest Circuit" for speaking tours by such experts. Instead of inviting one man to speak before an individual chapter, one man was invited to be a "circuit speaker" for the five chapters. Blake D. Mills, Jr., Puget Sound chairman, was designated as program coordinator for the 1952-53 season, a job which will be rotated among the five chapters from year to year in the future.

The program this year includes the following speakers and subjects: Raymond Ward, head of metallurgical research at Hanford Works, General Electric Co., who spoke before all but the Columbia Basin (his own) chapters during September, on "Metallurgy and Nucleonics". In October, R. B. Mears, manager of the research and development laboratory of U. S. Steel Steel Co., Pittsburgh, addressed the five chapters on "Corrosion". In November, A. G. Zima, head of the West Coast Technical Section of International Nickel Co., addressed the chapters on "Cast Iron". In March, the circuit speaker will be A.S.M. President Wilson. In April, V. N. Krivobok of the International Nickel Co. will speak.

In the next four issues of METALS REVIEW, one of the meeting reports of each of the speaker's lectures, will be printed. As President Wilson will tour a good many of the Society's 83 chapters, his circuit lecture will not be reported.

Reported by F. R. Morral
Kaiser Aluminum & Chemical Corp.

Raymond Ward, head of metallurgy research, engineering department, General Electric Co., Richland, Wash., spoke to the Inland Empire Chapter on Sept. 9 on the subject, "A General Concept of Metallurgy and Nucleonics."

Metallurgy plays an important role in the present and future development of atomic energy because the fuels, moderators, reflectors, and other materials of construction are often metallic in nature. Many new problems arise, a number of which require considerable work and ingenuity to solve.

Briefly, Dr. Ward covered the size (dollarwise) of some of the AEC installations; the total cost of all these installations makes the Atomic Energy project one of the largest industries in the United States.

In nucleonic engineering there are important economic and technical problems to be considered. Many of the technical problems are those concerned with materials, and here the metallurgist can play an important role. The fuels for nuclear reactors which are often metals, are produced and worked by well-known techniques, but they require special handling because of the hazards they present. New corrosion problems have to be studied, because of the new situations involving high temperatures, exacting conditions, as well as the hazardous materials which are necessary to use.

These problems have required an extension in the knowledge of many fields in metallurgy and considerable fundamental and development work seems to be necessary. Because the fuel elements often are highly active chemically and during fission can emit fission fragments into the surrounding media, protective coatings are required. These coatings should be inert to the fuel, refractory, good thermal conductors, corrosion and erosion resistant, have the ability to be shaped to fuel element, and have a low neutron capture cross section.

The metal used in the reflectors, whose purpose is to increase the efficiency of the neutron, is usually the same as that of the moderator, which must not capture neutrons. Beryllium and carbon are very suitable for the purpose. Also problems of cost, availability and toxity are important in the case of the metal beryllium.

The materials to hold coolants (air, water, molten metals or salts) are selected on the basis of service required of them as in other engineering applications.

The effect of radiation—an important environmental factor in the pile—on materials needs more study, according to Dr. Ward.

The metallurgical work at Hanford was divided into three phases: research and development; selection of materials; and consulting activities. To carry out this work, three types of laboratories are necessary, a cold, or the well-known type of metallurgical laboratory, where work is done on nonfissionable materials; a radio-metallurgical laboratory in which the proper precautions have to be taken to protect personnel from highly hazardous gamma radiation; and a plutonium metallurgical laboratory, where the radiation danger is not serious, but toxity is a factor.

Nucleonic engineering offers a challenge to the metallurgist with an open mind and a flair for the unusual, Dr. Ward concluded.

Circuit Speakers Schedule

October—Robert B. Mears, manager of research laboratory, U. S. Steel Co., Pittsburgh, on "Causes of Localized Corrosion."

November—Albert G. Zima, manager of West Coast Technical Section, International Nickel Co., on "Modern Cast Irons".

March—R. L. Wilson, director of metallurgy, Timken Roller Bearing Co., and president A.S.M., subject to be announced.

April—V. N. Krivobok, International Nickel Co., subject to be announced.

Circuit Speaker at Puget Sound

Dr. Raymond Ward (Left) Gave His Talk "A General Concept—Metallurgy and Nucleonics" Before the Puget Sound Chapter on Sept. 10. He is shown above with Mandel Minsk and Fred Baisch, both of Boeing Airplane Co., and Blake D. Mills, Jr., chapter chairman. Dr. Ward gave the same speech before the Inland Empire, Oregon, British Columbia and Puget Sound chapters during September on his Pacific Northwest Circuit

Tarasov Gives Aids To Better Grinding

Reported by James Terry
Field Engineer, Latrobe Electric Co.

Members of the Cincinnati Chapter heard L. P. Tarasov of the Norton Co. speak on "Metallurgical Aids to Better Grinding" at the October meeting.

Dr. Tarasov's lecture dealt mainly with the effects of alloying on the grindability of hardened steels, and the various factors that determine the sensitivity of steels to grinding cracks. He pointed out that recent developments in the toolsteel field with steels carrying high vanadium have posed new problems in grindability. However, the poor grindability of steels in this category is an indication of their ability to resist abrasion on the operations to which they are applied.

With regard to sensitivity to grinding cracks, Dr. Tarasov cited several conditions that affect the susceptibility of various types of hardened steel to crack in grinding. Under normal conditions, sensitivity to grinding cracks depends on the composition and microstructure of the steel being used. Deviations in heat treatment, such as overheating or undertempering, will increase sensitivity to grinding cracks. Excessive retained austenite was given as a third cause of increased sensitivity to grinding cracks. In speaking of low-carbon carburizing steels, Dr. Tarasov pointed out that excessive carbon in the carburized case of these steels increases the chances of developing grinding cracks.

Simple trouble shooting methods were described, such as etching of the ground surface and metallographic examination. These methods make it possible to determine the origin of grinding cracks in steel, whether they are due to improper grinding or heat treatment, or both, or perhaps some factor in the processing of the part, such as excess left in machining.

Describes Behavior of Uranium Under Study at Argonne National Lab.

Reported by Eugene M. Smith
Development Engineer
Youngstown Sheet & Tube Co.

James F. Schumar, associate director of the metallurgical division at Argonne National Laboratory, described the "Metallurgical Problems Involved in the Design of Nuclear Reactors" before the October meeting of the Mahoning Valley Chapter.

Mr. Schumar, in discussing the activities at Argonne, mentioned first the work of the metallurgists and other scientific personnel. He went on to point out the important factors in the selection of material for nuclear reactors. These are: neutron economy—the amount of neutrons absorbed by the material near the reaction zone; heat transfer—the mechanical and physical properties, corrosion resistance to coolant, and properties of the coolant; radioactivity—half-life of the material after it becomes radioactive; radiation damage—change in properties resulting from nuclear bombardment; fuel reprocessing; and fabricating properties—ability to shape the materials for the intended purpose.

Important facts about uranium are presently being developed by metallurgists. Uranium oxide is first chlorinated and then reduced with magnesium, somewhat similar to titanium or zirconium practice. Uranium has three phases: the alpha, stable below 665° C., is malleable; beta is brittle; and gamma is mushy.

The thermal conductivity of uranium is so low that transformation may occur during rolling as a result of local overheating. When alloyed, uranium forms no solid solutions, but is prone to form intermetallic compounds and low melting point eutectics. The mechanical strength of uranium drops from 52,000 psi. to 12,000 psi. when heated to 600° C.

Zirconium absorbs few neutrons, has excellent corrosion resistance, and, if it were easier to fabricate, would make a most promising material for jacketing uranium, which oxidizes very rapidly, even at normal temperatures, and thus requires a protective coating.

Wilson at Revere Night in Rome

At the October Meeting of the Rome Chapter Which Honored Revere Copper and Brass Inc., Are: Center Front, R. L. Wilson, President A.S.M., and From Left, W. M. Hinton, Revere Copper and Brass Inc., Chairman; R. M. Lake, Representing Revere's Rome Division Sustaining Membership; R. E. Hahn, Revere Copper and Brass Inc., Program Chairman; and C. E. Newcomb, Rem-Cru Titanium Inc., Guest Speaker. (Photo-Rome Daily Sentinel)

Reported by L. H. Decker
Revere Copper and Brass Inc.

Robert M. Lake, sales manager, Rome Division, Revere Copper and Brass Inc., and Ralph L. Wilson, president A.S.M., were guests of honor at Rome Chapter's October meeting. The evening was designated Revere Rome Division Night in recognition of the firm's sustaining membership. Mr. Lake gave a short chronology of Revere's operations, and defined the company's position in the industry today.

Charles E. Newcomb, supervisor of equipment engineering for Rem-Cru Titanium, Inc., presented a lecture on "Titanium". He described the properties of titanium which influence the nature of operations required to produce the metal. The production methods which are now used, and those which have commercial possibilities, were discussed.

A major portion of Mr. Newcomb's talk was devoted to the construction features necessary to prevent contamination of the metal by oxygen, carbon, and nitrogen in furnaces designed to melt titanium sponge and produce satisfactory castings. Because of its high melting point and great affinity for the above elements and others, a large part of the present high cost of commercial titanium and its alloys is derived from treatment of sponge. He predicted cost reductions as the scale of production increases.

Meet Your Chapter Chairmen

NORTHERN ONTARIO

G. E. WILLEY was born in 1913 in Vancouver, B.C., and educated in the public schools at Dundas, Ont. He attended McMaster University in Hamilton, Ont., graduating with honors in mathematics and physics in 1936. He did postgraduate work at the University of Toronto, where he majored in physical chemistry, and received his M.A. degree in 1938, and his Ph. D. degree in 1940.

Mr. Willey is division superintendent of steel rolling for Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont., at the present time. He joined Algoma in 1946 as a research metallurgist. During the war he was sent as a research fellow to various industrial plants to assist in solving metallurgical problems and fabrication methods on war materials for the Ontario Research Foundation, Toronto, and before joining Algoma he was a metallurgist and development engineer for N. Slater Co., Hamilton.

Mr. Willey and his wife have three children, Barbara Anne, 9, and twin sons, Robert and Ronald, 6. He is a photography fan and enjoys stamp collecting. He likes to run educational and study classes.

In spite of my research background, Mr. Willey says, I prefer to keep my feet on the ground, head out of the clouds and do practical work with industrial men. I want to see results and help men learn the sciences and basic fundamentals behind their work. He would like to see closer liaison between Canadian industrial and research men.

NEW JERSEY

WILLIAM C. SCHULTE is a graduate of the University of Illinois, and holds a M.S. degree in metallurgy from the University of Wisconsin. For several years he was employed in the welding research laboratories of the A. O. Smith Corp., Milwaukee. Following this, he spent a year and a half at Lehigh University on an Engineering Foundation Welding Research Fellowship. The next four years he spent at Lukens Steel Co., Coatesville, Pa., where he was a research metallurgist in the metallurgical laboratory. From 1938 to 1942 he taught metallurgy and metal processing at Rutgers University, and in 1942 he joined the propeller division of Curtiss-Wright Corp., where he has been employed as chief metallurgist since 1942.

While at Curtiss, Mr. Schulte has served on the SAE Aircraft Materials Specification Committee and on the SAE Iron and Steel Technical Committee. He is now on the A.S.M. Committee on Vocational Education.

There are three boys in the Schulte family, ranging in age from 6 to 17. Raising a family, taking care of A.S.M. work, and earning a living leave him only a small amount of time to devote to his single hobby, photography.

PURDUE

C. R. ANDERSON, chairman of the Purdue Chapter A.S.M., was born in South Dakota in 1920. He lived on a farm and attended a country school, then attended South Dakota University and South Dakota School of Mines and Technology, receiving his B. S. degree in metallurgical engineering from the latter in 1942.

Mr. Anderson was employed as a research metallurgist at the Aluminum Research Laboratories of Alcoa at New Kensington, Pa., in 1942. He later transferred to the Lafayette Works of Alcoa as a metallurgist, and has been extrusion chief metallurgist at Lafayette Works since 1944. He has several patents pending, and is a registered professional engineer.

Carl is a member of the Elks and the Masons. He and his wife have two boys, and he likes fishing, golfing, hunting, baseball and football. His family participates in all of these activities with him except the hunting.

LOS ALAMOS

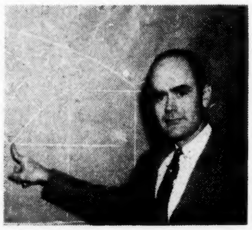
F. H. ELLINGER, chairman of the Los Alamos Chapter A.S.M., was born in Ridgway, Pa., in 1909. He received his B.S. degree in metallurgy from Case Institute of Technology in 1932, after which he started to work in the statistical department at General Electric Co.'s Nela Park in Cleveland. In 1944 he was transferred to G.E.'s Cleveland wire works. He returned to Case where he obtained his M.S. degree in 1941. From 1944 to 1946 he served as a Naval officer in the Pacific theater. After his release from service, Mr. Ellinger joined the physical metallurgy group of the Los Alamos Scientific Laboratory, where he is now located.

Mr. Ellinger is married and has one son. He likes to read and bowl in the winter, and enjoys camping, hiking and fishing in the summer.

SPRINGFIELD

CARL A. KEYSER was born in January 1918 in Washington, D.C. He attended public grammar and high school in Washington, and entered Worcester Polytechnic Institute in 1935, where he majored in chemistry. He graduated with a B.S. degree in that field in 1939. He returned to W.P.I. for two years of postgraduate work as a graduate assistant in chemistry, and received his M.S. degree in 1941.

Carl was commissioned an Ensign in the U.S.N.R. in 1941 and went on active duty as an assistant to the director of the production division of the Bureau of Ordnance from 1941 to early 1943. He spent about two years on the destroyer U.S.S. Eberle as a gunnery and an executive officer. In 1945-46 he attended the U.S. Naval Academy postgraduate school, specializing in metallurgical engineering at the Carnegie Institute of Technology, where he received a B.S. degree in metallurgy in 1946. His present rank in the Naval Reserve is Lieutenant Commander.



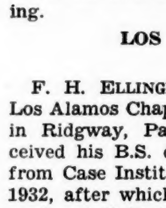
Carl A Keyser

From 1946 to early 1947 he was personnel manager of the H. H. Brown shoe factory in Worcester, Mass. In 1948 he became assistant dean at the University of Massachusett (then Massachusetts State College), and later shifted over to full-time teaching in the school of engineering.

In 1952 his book, Basic Engineering Metallurgy, was published by Prentice-Hall, Inc. He has been chairman of the Western Massachusetts Section of the A.W.S.

Mr. Keyser has two children, Peter, 4, and Mark, 2. His hobbies include gardening, fishing, golf, sketching and painting.

W. C. Schulte



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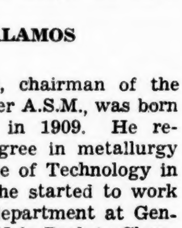

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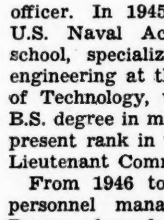

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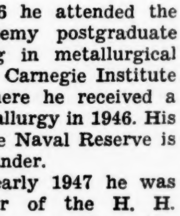


Cartridge Cases Topic of Talk at Canton-Massillon

Reported by J. M. Brunner
Metallurgist, Republic Steel Corp.

The metallurgical and mechanical aspects of the manufacture, heat treatment, and inspection of steel cartridge cases were presented by Seymour S. Rice, chief metallurgist of Ekco Products Co. in December at Canton-Massillon in his talk, "Cold Forming and Heat Treating of Steel Cartridge Cases."

Mr. Rice explained that large cartridge cases are now being made of a 1030 type of steel because of the expected shortages of copper and zinc during an all-out emergency, and also explained in detail the advantages and disadvantages of steel and brass cartridge cases. Steel cases are more vulnerable to failures if proper manufacturing and heat treating procedures are not used.

Mr. Rice then discussed the manufacture of a 90-mm. cartridge case from the blank to the finished product. The blank material prior to the first cupping operation must be completely spheroidize-annealed by holding from 40 to 60 hr. just below the transformation temperature. The initial cupping operation is then followed by five drawing stages with the steel being conditioned or softened by a 1250 to 1300° F. anneal and lubricated between each operation. The modern technique of lubrication for mechanical drawing or deep drawing operations consists of coating the cases with zinc phosphate and a hot liquid soap spray, to produce a dry, clean lubricator.

One of the most critical cold forming operations is the heading operation because the inside radius must be generous, well annealed, free from notch defects, and have good flow characteristics adjacent to the radius. Initial preheading is performed in the third drawing operation and the base flange started during the fifth draw. Steel cases are induction heat treated from the flange to 6½ in. above the flange to increase yield strength in this location.

The entire hardening process is performed in 11½ sec. After hardening, the cartridge cases are tempered to approximately Rockwell C-40, the neck tapered and mouth annealed for crimping on the projectile, and a stress anneal performed to relieve the neck forming operation. A second tempering operation is used to transform any austenite remaining after first temper.

A magnetic comparator is used for inspection of heat treatment results. The final product is given a baked-on protective varnish coat.

Johnson Gives Andrew Carnegie Lecture

At the Speaker's Table During the Fifth Annual Andrew Carnegie Lecture of the Pittsburgh Chapter in October Are, From Left: T. H. Kennedy, Superintendent, National Works, National Tube Division, United States Steel Co.; H. W. Johnson, Vice-President in Charge of Steel Manufacturing, Inland Steel Co., Who Spoke on "This Confusing Steel Business"; George W. Snyder, Chapter Chairman; and M. W. Lightner, Past Chairman

Reported by Alan Terrile
Staff Metallurgist Crucible Steel Co. of America

Approximately 200 members of the Pittsburgh Chapter heard Hjalmar W. Johnson, vice-president in charge of steel manufacturing, Inland Steel Co., present a talk on "This Confusing Steel Business" at the Fifth Annual Andrew Carnegie Lecture in October.

Mr. Johnson cited the early days of iron and steel manufacturing when simplicity of organization was the order of the day. Iron was made to meet fracture test requirements only, with no complexities or confusions. However, advances in steel manufacturing techniques required higher quality iron of consistent and predictable composition, and the blast furnace had to hire a chemist, the beginning of the first staff department. Further progress initiated more complexities, which, in turn, led to further departmental additions, such as safety, industrial engineering, accounting, metallurgy, and statistical quality control.

The speaker recounted many interesting tales and anecdotes of personal experiences. The metallurgist was blamed for the trials and tribulations of the steel manufacturer,—all in good fun, as Mr. Johnson went on to explain that all of the progressive developments that have rewarded the efforts of the metallurgists required expanded organization and improved equipment to make ever better products for public consumption and use.

Speaker Explains How Corrosion Can Be Conquered

Reported by William H. Myers
Metallurgical Department, Macwhyte Co.

Frank L. LaQue, head of the corrosion engineering section at the International Nickel Co.'s Development and Research Division, presented a talk on "Progress in Conquering Corrosion" at the October meeting of the Milwaukee Chapter.

Throughout his talk, Mr. LaQue presented portions of his company's color film "Corrosion in Action". This film illustrated very clearly the mechanics of simple corrosion reactions. Various corrosion experiments were filmed and the results were demonstrated graphically.

Mr. LaQue stated that corrosion on a single metal surface is an electrochemical reaction. He discussed the nature of passivity and protective films and their relation to corrosion problems. When considerable evolution of hydrogen occurs as the principal cathodic reaction, he said, a mistake in selection of materials to resist corrosion has been made. As current flows from steel in salt water, the steel tends to become more noble.

The great disparity of corrosion results caused by dissimilar large and small metallic areas was discussed. To illustrate the accelerated corrosion rate of dissimilar areas, Mr. LaQue told of an attempt, some years ago, of a group to build a ship with a nonfouling bottom. The iron hull frame was covered with Monel plates riveted with Monel rivets. Finishing up a few rivets short, the workmen used steel rivets to complete the job. Before the ship had been fitted out, it sank at its slip due to the failure of the steel rivets.

In discussing effects of alloying on potentials of alloys, Mr. LaQue stated that corrosion product films interfere with theoretical results and that sometimes alloys develop a noble characteristic in spite of the addition of less noble elements.

Kansas City Hears Willard on Aluminum

John R. Willard (Center), Manager of Sales Development Division of the Aluminum Co. of America, Discusses His Talk on "Recent Developments in Aluminum" With H. D. Beeson, Program Chairman (Left), and James G. Cametti, Chapter Chairman (Right), at the October Meeting of the Kansas City Chapter. (Photograph by C. P. Kenyon, Sheffield Steel Corp.)

Reported by K. E. Rose
University of Kansas

John R. Willard, manager of the sales development division of the Aluminum Co. of America, discussed "Recent Developments in Aluminum" at the October meeting of the Kansas City Chapter.

Just 100 years ago aluminum was selling at \$545 per lb. By 1859 it was selling for \$17 per lb., and as recently as 1889 one of Alcoa's founders reported that practically no one was interested in buying 1000-lb. lots of the new light metal at \$2 per lb. Subsequent developments resulted in a peak production of over 1¾ billion lb. in 1943, nearly a 10-fold increase over 1939.

Among the newer alloys is one that puts aluminum in the 100,000-psi. class for the first time, and another, developed for joining aluminum, that develops 35,000 psi. across the weld. Composite brazing sheets containing three different compositions have greatly extended the possibilities of aluminum cladding and joining aluminum to other metals.

New forging and extrusion presses will now permit the manufacture of much larger sections. Mills have been designed to roll tapered sheet. Ingot sizes have increased proportionately to accommodate these new units, and 10,000-lb. ingots have been poured.

New solder and noncorrosive fluxes have extended the electrical applications of aluminum wire. Cold welding under high pressure at room temperature is useful in electrical work, and offers interesting possibilities in other fields. Resin-base cements now provide bonds with strengths up to 8000 psi., and have been used in pressure vessels up to 2000 psi.

Mr. Willard stated that aluminum is abundant and that further expansion of production depends primarily on availability of electric power for reduction of the ore.

San Diego Hears About Extrusion of Aluminum Alloys

Reported by John W. Welty
Assistant Director of Research
Solar Aircraft Co.

Roy E. Paine, chief metallurgist of the Vernon Works, Aluminum Co. of America, addressed the San Diego Chapter on the "Extrusion of Aluminum Alloys" in October.

He discussed the history, development, and current applications of the extrusion process for aluminum alloys, pointing out methods, alloys, and such process factors as operating temperatures, speeds and pressures, and described their effect on the properties of the extruded sections. Some new products now being made available to the **aircraft** designer were also mentioned.

The Alcoa film, "The Davenport Story," which portrays the use of aluminum products in the construction of the buidlings for the modern sheet mill at Davenport, Iowa, was shown.

Tulsa Hears Talk on Titanium and Its Alloys

Reported by Guy V. Bennett
Materials and Process Engineer
Douglas Aircraft Co.

"Titanium and Titanium Alloys" were discussed by R. S. Nycum of the Titanium Metals Corp., at the October meeting of the Tulsa Chapter. Mr. Nycum opened his discussion by comparing the advantages and disadvantages of titanium over other metals.

Titanium's strength-to-weight ratio, corrosion resistance, and the fact that it is the fourth most plentiful structural material in elemental form, were given as points in its favor, while difficulties in refining, machining, and fabrication were cited as disadvantages.

Mr. Nycum commented on the rapid increase in the production of titanium in the last few years, from a 2½-ton output in 1948, to 70 tons in 1950, 700 tons in 1951, to an estimated 500 tons to be produced in 1952.

The two processes for recovering the metal from the ore, the Kroll process and the iodide process, were discussed, with particular emphasis placed on the more widely used of the two, the Kroll process. Titanium gems were discussed briefly, and a display of gems was shown at the close of the meeting.

The arc melting techniques used by the Titanium Metals Corp., and the rolling of cast titanium ingot were mentioned, as well as forming techniques, although Mr. Nycum pointed out that most of his company's production is in the form of semifinished products for sale to fabricators.

Fletcher Stresses Necessity of Proper Tool and Die Steels

Reported by J. M. Brunner
Metallurgist, Republic Steel Corp.

The fundamental principles of the proper selection of tool and die steels, their heat treatment, and specific properties were presented by Stewart G. Fletcher, chief metallurgist, Latrobe Steel Co., at the November meeting of the Canton-Massillon Chapter A.S.M.

Dr. Fletcher reviewed the major considerations for the selection of tool and die steels: cost, relative efficiency, and ease with which the tool can be made. He pointed out that tool and die steels play a vital part in practically all metal industries, but that the toolsteel tonnage produced amounts to only 0.1% of the total steel produced annually in this country.

He placed special emphasis on heat treating correctly and accurately in order to develop optimum properties in tool and die steels, and used slides to show the various types of tool and die steels, their compositions, and response to hardening and tempering. He listed the major reasons for tempering, namely, to toughen for use, to stress relieve, and to complete transformation. He also explained the secondary hardening phenomenon which occurs during heat treating.

Dr. Fletcher discussed substitution of molybdenum for tungsten during World War II when tungsten was in short supply. He emphasized close control during heat treatment for molybdenum-type toolsteels.

High-Temperature Oxidation Resisting Coatings Explained

Reported by A. D. Carvin
Joslyn Mfg. & Supply Co.

The Fort Wayne Chapter's October meeting featured Ralph F. Wehrmann, research chemist, Fansteel Metallurgical Corp., Chicago, as guest speaker. He spoke on "High-Temperature Oxidation Resisting Coatings".

With few exceptions, materials oxidize when heated in air because oxides, as a group, are the most stable of all known substances, Dr. Wehrmann explained. It is only in recent years that significant progress has been made toward an explanation for the fact that metals survive oxidation at all. Theories of the passivity of metals and formation of oxide surface films were explained by the speaker.

The rate at which oxidation proceeds varies greatly from one metal to another and is determined by (*a*) the properties of the metal and (*b*) the nature of the environment. The methods of preserving metals are based on changing one or both of these conditions.

A specific and practical example of coatings is molybdenum. It is a relatively abundant refractory metal; its properties have been studied over a broad temperature range; and molybdenum oxidizes readily at elevated temperatures in air. Only four metals, tungsten, rhenium, tantalum and osmium, have melting points higher than that of molybdenum (2625° C.). None of these are available in adequate quantities.

The load-carrying capacity of molybdenum is superior to alloys now being used commercially at temperatures above 1000° C. However, it oxidizes readily, forming a volatile oxide. The most promising developments in overcoming this are (*a*) cladding with nickel or platinum or their alloys, (*b*) coating with silicon or ceramic materials, (*c*) electroplating with chromium, and (*d*) production of oxidation-resistant alloys.

A method of protecting molybdenum was devised as a result of a Fansteel project started at Battelle Memorial Institute in 1942. Such coatings have offered protection to molybdenum at 815° C. in air for 6500 hr. without failure, and for 3700 hr. at 1090° C. The oxidation resistance of these coatings is very good. Two serious disadvantages are: (1) lower creep rate than the molybdenum and (2) lower coefficient of expansion than molybdenum. During coating the molybdenum is recrystallized, which is undesirable for some applications. And finally, large and complicated shapes are difficult to coat.

In closing, Dr. Wehrmann stated that during the past few years, definite and significant progress has been made in the direction of stabilizing the surface of molybdenum. However, no completely satisfactory commercial method has yet been developed. Because of the importance of the subject and the extent of the investigations being pursued, many worthwhile developments can be expected in the near future.

AIME Annual Meeting

The American Institute of Mining and Metallurgical Engineers is holding its annual meeting from Feb. 16-19, 1953, at the Statler Hotel, Los Angeles, Calif. For further information, contact Ernest Kirkendall, secretary, Metals Branch, A.I.M.E., 29 West 39th St., New York 18, N. Y.

Willard Speaks in St. Louis

John R. Willard, manager of the sales development division of the Aluminum Co. of America, spoke on "Recent Development in Aluminum" before the October meeting of the St. Louis Chapter. Mr. Willard's talk has also been reported by the Kansas City Chapter (see p. 10).

Oregon Giving Course on Heat Treating of Steel

The Oregon Chapter is currently conducting an educational series of lectures on the "Practical Heat Treating of Steel". The course, which is being conducted by Olaf G. Paasche, professor at Oregon State College, consists of five meetings, being held Jan. 14, 21, and 28, and Feb. 4 and 11, at Grant High School, Portland. Each lecture will be followed by an informal discussion period to answer questions and discuss material and heat treating problems.

Atomic Power Discussed at New Haven

"The Role of Metallurgy in the Development of Atomic Power" Was the Topic Under Discussion at the October Meeting of the New Haven Chapter. At the speaker's table are, from left: E. A. Lovering, treasurer; W. D. Robertson, technical chairman; A. R. Kaufmann, guest speaker; C. B. Christensen, chairman; R. P. Nevers, vice-chairman; and R. C. Raymond, secretary. Dr. Kaufmann is from Massachusetts Institute of Technology

Reported by Glenn F. Whiteley
Heppenstall Co.

"The Role of Metallurgy in the Development of Atomic Power" was discussed by A. R. Kaufmann, associate professor at Massachusetts Institute of Technology, at the October meeting of the New Haven Chapter.

Dr. Kaufmann stated that the production of atomic power is fast becoming a reality. Within a few years there will probably be reactors suitable for propelling submarines and for stationary power units comparable in size to the largest public utility generating stations. Since the heat generation per unit volume of reactor core is many times greater than is employed in standard power plants, it is generally recognized that the development of satisfactory materials for reactor use is the greatest bottleneck in this new field.

Dr. Kaufmann then pointed out a number of important aspects of power reactor construction and operation and indicated the role which would be played by metallurgy.

It has been determined that most metals do exhibit measurable changes in physical properties as a result of neutron exposure. This radiation damage is similar to cold working and may be corrected by annealing. Since radiation damage is so very important, it can be readily understood that there is a great opportunity to apply fundamental knowledge of metallic structure to the solution of this practical problem. The Atomic Energy Commission has constructed a high flux pile specifically for testing materials under conditions to be encountered in future reactors.

Metallurgy can play a large part in the development of atomic power by finding means to obtain such elements as beryllium, zirconium and vanadium in a sufficient degree of purity to have good engineering properties and at a reasonable cost.

Boston Hears Toolsteel Progress Report

Stewart G. Fletcher (Center), Chief Metallurgist at Latrobe Steel Co., Who Spoke on "Recent Developments in Toolsteels" at the October Meeting of the Boston Chapter, Is Shown Above With William Badger, Chapter Chairman, and Morris Cohen, Technical Chairman. (Photo by H. L. Phillips)

Reported by William F. Collins
United-Carr Fastener Corp.

Two hundred members and guests attended the initial meeting of the Boston Chapter to hear "Recent Development in Toolsteels," discussed by Stewart G. Fletcher, chief metallurgist, Latrobe Steel Co.

Dr. Fletcher first spoke on the manufacture of toolsteels, and the recent progress made in this field, especially in high speed steels. In the manufacture of quality steels, mills are faced with many problems, such as carbide segregation, hammer bursts, overhammering, nonmetallic inclusions, and surface decarburization, which require careful control for high quality.

Segregated areas in high speed steels will reduce the impact strength as much as 30%. In high-carbon. high-chromium steels, segregation is often the cause of distortion and cracking in heat treatment. Hammer bursts in forging operations are always a source of trouble, and overhammering will also produce a steel of poor quality.

To aid the steelmaker in inspection and control for all these conditions. the development of ultrasonic testing has become invaluable. With experience, a good operator can pick up the type of defect by the pattern formed.

Other recent major advances in quality and steelmaking techniques include electric hot topping, which employs electricity as a source of heat in the top of the mold, keeping the steel in a molten state so that it can flow into the shrinking cavity as the ingot solidifies.

In the field of progress in toolsteel alloy development, there have been two major developments: the replacement of tungsten as an alloying element in high speed steels by the use of molybdenum; and increasing the vanadium content for better efficiency in high speed steels for cutting purposes, and in high-carbon, high-chromium die steels for improved abrasion resistance, for applications such as drawing and blanking dies, brick mold and sand slinger liners.

Titanium Casting Lecture Given at Penn State Chapter

Reported by Walter Showak
Pennsylvania State College

Members of the Penn State Chapter heard a lecture on "Titanium Casting" given by O. W. Simmons and R. E. Edelman of the Frankford Arsenal at their October meeting.

O. W. Simmons discussed the problems encountered in the extraction of titanium from its ores, and in subsequent melting and casting of the metal. R. E. Edelman discussed the important physical and mechanical properties of the metal, along with the effects of alloying elements and impurities on these properties. Motion pictures and slides were used throughout the discussion to illustrate important points.

The melting and casting of titanium has been a problem because, when in the molten condition, it reacts readily with the atmosphere and all of the common crucible materials. Water-cooled copper and graphite vessels in an inert atmosphere are being used. Use of graphite is limited because of carbon pickup by the metal.

At present, experimentation has shown that the maximum solid solubility of carbon in titanium is around 0.25%. The carbon content has a very marked effect on the mechanical properties of titanium. As the carbon content is increased, the ductility rapidly decreases, whereas the tensile strength and hardness gradually increase. A remarkable feature of titanium is that its 0.2% yield strength is about 80% of its tensile strength.

Titanium has only half of the weight of steel and, when alloyed, its strength exceeds that of steel. These properties, along with its great corrosion resistance, make it a valuable metal for use in aircraft, seagoing vessels, and armor plate. Titanium, however, shows a measurable creep rate at 800° F, and must be alloyed for use at high temperatures.

Crystal Growth and Defects Illustrated in Talk at Indianapolis

Reported by William E. Hensley
Allison Div., General Motors Corp.

Robert L. Fullman, associated with General Electric Co., Schenectady, discussed "Crystal Growth and Defects" at the October meeting of the Indianapolis Chapter.

The perfect crystal was originally conceived to explain physical and mechanical properties of crystals, according to Dr. Fullman. The hypothesis of the perfect crystal explained electrical and elastic properties. However, it could not account for malleability, strength, or even for the existence of crystals, since the theory predicted that perfect crystals would not grow except at much higher supersaturation than that at which growth is observed.

A new theory was evolved that explains the existence of crystals. This theory postulates that defects exist in crystal structures. Three types of defects were explained by Dr. Fullman. They are vacancy, or absence of an atom from its crystal structure; interstitial, or presence of an extra atom in the crystal structure; and dislocation. Two types of dislocation, edge and screw, were illustrated, and it was shown how screw dislocation can account for crystal growth.

In conjunction with his talk, Dr. Fullman showed slides which more clearly depicted the subject he was discussing. Two of the most interesting slides were those showing spiral growth steps, as predicted by the dislocation theory. One slide was a photomicrograph of a carborundum crystal; the other was the growth pattern of a paraffin crystal.

Jet Engines Explained to York Chapter

Reported by A. Floyd Whalen
Metallurgist and Chemist
Harrisburg, Pa.

In November the York Chapter made its annual pilgrimage to Harrisburg and enjoyed an afternoon visit at the Harrisburg Plant of Thompson Products, Inc. In a 2-hr. conducted trip through this very busy plant, which makes the compressor assembly for turbojet airplane engines, everyone marveled at the amount of metallurgy crowded into the compressor.

The Chapter was entertained by a supper furnished by the company and heard Robert A. Paetz, chief engineer of the Jet Division, speak on "The Jet Engine".

Ignoring the propeller type of airplane, Mr. Paetz divided his subject into three types of jet engines and proceeded to describe the enormous amount of research and development needed for this project. He mentioned that without the vast expenditure of the Government on a wartime basis, the jet industry would still be in the embryo stages. No private industry unassisted could have undertaken projects which were necessary for this development.

There are at present four varieties of propulsion power plants, the turbine jet engine, the turboprop engine, the ram-jet engine, and rocket motors. The operation and advantages of each power plant system were discussed. The urgent requirements for military turbojets have initiated vast research programs relating to metallurgy and the development of new alloys.

In addition to research, valuable design work has been done which now makes possible efficient utilization of available materials and confidence in their basis for design.

The critical material aspect was mentioned in relation to the fact that not enough materials are available for rapid expansion in a military aircraft program, and that additional research and development are now being conducted to reduce greatly the required critical material content of jet engines. Ceramics, intermetallics and titanium were also discussed.

CORRECTION

An additional 10,000, rather than 100,000 copies of *Metals Handbook* mentioned in the Secretary's Report in the December issue of the *Review*, were printed in June 1952.

Lecture Course Proves Popular

E. F. Lundeen, Assistant Superintendent, Qaulity Control Department, Inland Steel Co., Is Shown Above During the Presentation of the Second in a Series of Educational Lectures Being Given by the St. Louis Chapter. He spoke on the "Metallurgical Factors in Drawing and Forming of Metals"

Reported by Julius Turk
Process Control Supervisor
Emerson Electric Mfg. Co.

E. F. Lundeen, assistant superintendent, quality control department, Inland Steel Co., presented the second in a series of educational lectures on the "Metallurgy of Fabrication" being given by the St. Louis Chapter. The title of his lecture was "Metallurgical Factors in Drawing and Forming of Metals".

Mr. Lundeen touched upon the history of manufacture and progress in cost control of prime quality sheets, with special reference to uniformity and yield factors. The standard acceptable analysis and effects of elements, especially sulphur, as well as surface defects, were considered with regard to manufacturing and drawing characteristics. No fast dividing line between commercial and drawing quality sheet was noted, but control is primarily by use of a select part of the ingot after proper discard.

Manufacturing control tests involving Rockwell hardness, Olsen cup and microstructure were noted. These indicate certain physical characteristics relative to possible drawing effects, but are not a positive indication of the drawing quality of the sheet.

The most common type of draws and the effects on drawing of surface conditions, wrinkling, breakage, and lubricants were described and considerable emphasis placed on the actual trial of each lot of material to determine drawing ability.

Technical Papers Invited For A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1954 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 35th National Metal Congress and Exposition to be held in Cleveland, Oct. 19 to 23, 1953. Papers that are selected for presentation will be printed and manuscripts should be received at A.S.M. headquarters office not later than April 10, 1953.

Acceptance of a paper for publication does not necessarily infer that it will be presented. The selection of approved papers for the convention program will be made in early June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

Averbach Talks on Metal Structures

Reported by Howard E. Boyer
Chief Metallurgist, American Bosch Co.

"Fundamentals of Metal Structure" was the subject of the talk presented by B. L. Averbach at the October meeting of the Springfield Chapter. Dr. Averbach is assistant professor of physical metallurgy at Massachusetts Institute of Technology.

Professor Averbach's talk was concerned mainly with new phenomena which have been revealed by means of X-ray diffraction and the electron microscope relative to the decomposition of martensite which occurs during tempering of hardened steels. Single-crystal X-ray technique has shown that during the first stage of tempering (below 500°F.), a low-carbon martensite containing approximately 0.25% carbon appears in metastable equilibrium with a hexagonal carbide called epsilon carbide. Electron photomicrographs have shown that the epsilon carbide appears as a subboundary network as subgrains in the martensite.

The next stage of tempering overlaps somewhat the end of the first stage and involves the formation of cementite. Here, again, recent electron micrographs indicate that the early cementite forms as thin plates along boundaries of martensite needles. It is possible that the formation of this early cementite may be responsible for the notch brittleness which toolsteels exhibit upon tempering in the range of 500 to 700° F. The presence of these plates may contribute to the early propagation of small cracks and thus account for the unfavorable notch properties of steels tempered in this temperature region.

Professor Auerbach stated that it seems quite likely that the future may see marked changes in the technique of tempering certain steels, when and if these phenomena can be established.

Shows How Boundary Zone Cracking Problems Can Be Solved

Reported by A. S. Vince
Royal Canadian Mint

At the Ottawa Valley Chapter meeting in October, H. Thomasson, manager of metallurgical and mechanical laboratories for Canadian Westinghouse, and twice winner of a Lincoln Foundation Award, discussed "Metallurgical Aspects of the Boundary Zone".

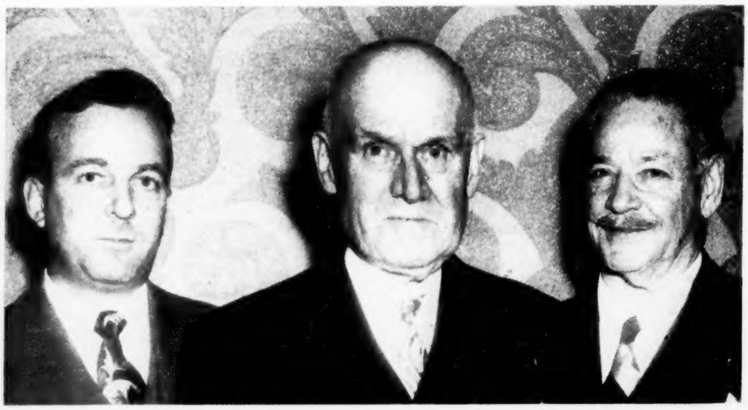
A large number of microhardness determinations showed that very high hardness values can be obtained in the boundary zone region, and the depth and hardness of this zone increase with the hardenability of the steel. This hard zone gives rise to machining difficuties and underbead cracking. Even in low-carbon steel such hard spots are present, since the carbon concentrated in the pearlite grain does not have time to diffuse during the short welding cycle, and hard martensitic patches are formed.

Mr. Thomasson stressed that every welder is also a heat treater in the local area of the weld, and that the problems of the weld zone outlined above can be solved from considerations of heat treating. Thus, it was shown that larger electrodes and lower welding speeds have a beneficial effect because of their influence on heating, and particularly cooling rates, in the weld. Similarly, it was shown that an increase in the mass of the sample gives trouble because of the increased cooling rate of the weld; this also applies to the ends of the weld bead.

Preheating the sample from 400 to 800° F. before welding has a pronounced beneficial effect, and the hard zone can also be softened by a postheat of 1 hr. at 1200° F., but this is not as satisfactory because of the higher temperatures and longer times involved, and the possibility of underbead cracking before the article can be placed in the furnace.

Therefore, trouble due to hard spots and cracking in the boundary zones of S.A.E. 1020 and 1040 steels can be overcome by an increase in the electrode size, reduction in the welding speed, and, if necessary for thicker material, preheating prior to welding.

63 Years of Combined A.S.M. Service



Willard H. Neu, Secretary of the Pittsburgh Chapter for the Past Four Years, Hiram Walker, Who Has Served for 25 Years as Chairman of the Pittsburgh Chapter, and William H. Eisenman, A. S. M. National Secretary. for Over 34 Years, Are Shown Together at the November Meeting of the Pittsburgh Chapter, Which Was Also National Officers' Night. The photograph represents a combined A.S.M. secretarial experience totaling 63 years. National President R. L. Wilson and Vice-President James B. Austin were also present at this meeting. Mr. Wilson presented a talk on "Current Developments in Alloy Constructional Steels", which will not be reported here because it is being given at many of the chapters throughout the course of the year. (Reported by George J. Salvaggio)

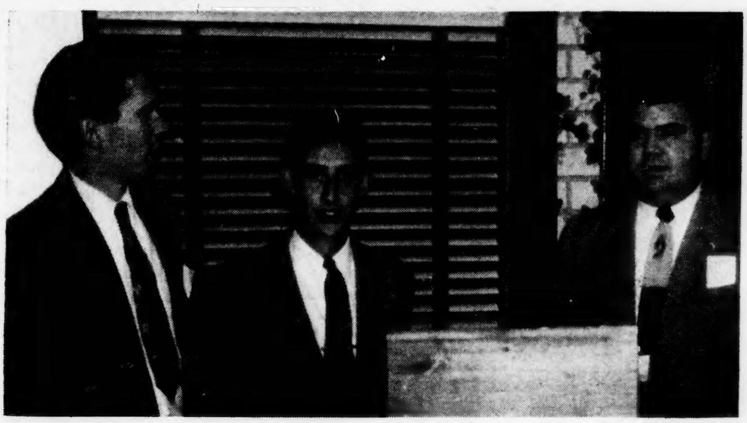
Inland Empire Plans Series of Lectures On Aluminum

Reported by F. R. Morral
Kaiser Aluminum & Chemical Corp.

The Inland Empire Chapter has organized an 8-lecture educational course, to be presented on Tuesday evenings, Feb. 3, 10, 17 and 24, and March 3, 10, 17, and 24, 1953. The lectures will be held in the Engineering Building at Gonzaga University. W. J. Lawler, technical superintendent at Kaiser Aluminum & Chemical Corp., is chairman.

Mr. Lawler is presently getting together a panel of experts to present the topics discussed in the A.S.M. book, "Physical Metallurgy of Aluminum Alloys," and on the subject of corrosion and finishing of aluminum and its alloys. A series of films will also be shown which will demonstrate how to do things with aluminum.

Explains Titanium Alloy Systems



Eastern New York Chapter Heard Donald J. McPherson Discuss "Constitution and Properties of Titanium Alloy Systems" at the October Meeting. Shown are, from left: Warren F. Savage, Rensselaer Polytechnic Institute, chapter chairman; Dr. McPherson; and T. P. Davis, Allegheny Ludlum Co.

Reported by John Gerken
Rensselaer Polytechnic Institute

A talk on the "Constitution and Properties of Titanium Alloy Systems" was presented by Donald J. McPherson at the October meeting of the Eastern New York Chapter. Dr. McPherson is supervisor of physical metallurgy at the Armour Research Foundation.

Dr. McPherson pointed out that research and development on titanium, unlike other metals, are keeping slightly ahead of production practices. The late development of the metal in ductile form, and a great deal of government-sponsored research, are responsible for this unique condition. Early physical metallurgical studies of this type can help speed the development of an alloy system over the "shotgun" type of approach of mixing metals to see what happens.

The hexagonal close-packed form of titanium, which is stable below 1625° F., is more ductile than other hexagonal close-packed metals. This is because titanium has 27 known deformation systems, compared with only 9 for Mg, Cd, and Zn. The elements alloyed with titanium may be classed in three groups, according to their effect—those which form eutectoid diagrams similar to the iron-carbon system, those which stabilize the body center cubic structure at lower temperatures, and those which stabilize the hexagonal close-packed structure at higher temperatures. Examples of these three groups are (*a*), Si, Cr, Fe, Co, Ni, Cu, Mn; (*b*) Mo, V, Ta, Cb; (*c*) Al, C, N, O.

The eutectoid-type system suggests heat treatment similar to that for steel. However, the quenched acicular product of titanium alloys is relatively soft.

Prof. Bray of Purdue Dies

John L. Bray, 62, professor of metallurgy on the Purdue University staff since 1923, and head of the school of chemical and metallurgical engineering from 1935 to 1947, died at his home in West Lafayette on Dec. 6 after an extended illness.

Prof. Bray was born in Millbridge, Mass., in 1890, graduated from Massachusetts Institute of Technology in 1912, and obtained a doctorate there in 1930. He had eight years' experience with mining companies in Central and South America and British Columbia, and taught for a year at M.I.T. and at Nova Scotia Technical College. He served a year with the U. S. Tariff Commission in Washington before coming to Purdue.

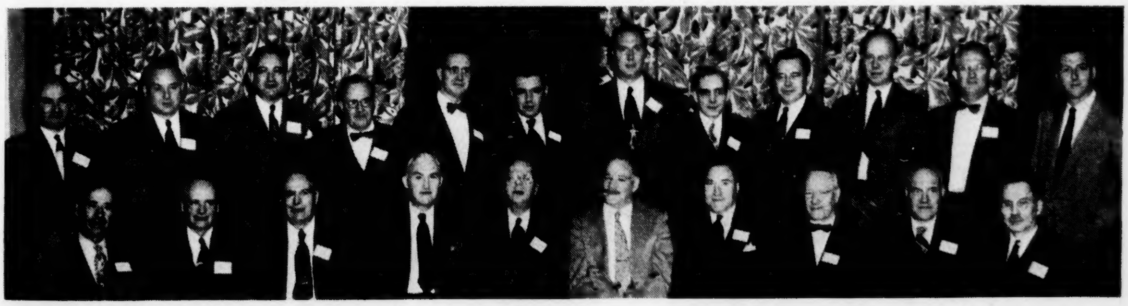
He had retired from the administrative duties in the school of chemical and metallurgical engineering at his own request in 1947 because of ill health, and had given his time to teaching and research since then. Last year he was awarded the Sigma Delta Chi "Best Teacher" award made annually. Dr. Bray was a member of many technical societies and was active for some year in several of them.

Hear How to Minimize Heat Treating Headaches

Reported by W. A. Schaefer
H & M Metal Processing Co.

The October meeting of the Akron Chapter featured Norman O. Kates, chief metallurgist at Lindberg Steel Co., Chicago, who spoke on "Minimizing Heat Treating Headaches". Mr. Kates discussed the many causes of failures of tools due to heat treating, design, and the selection of material grades.

Officers and Past Chairmen Honored



The Syracuse Chapter Honored Both National Officers and Past Chairmen During Its October Meeting. Present were, standing, from left: W. L. Hodapp, W. G. Slack, K. W. Robertson, E. G. White, R. N. Gillmor, J. T. Mitchell, J. D. Boedicker, Frank C. Wheeler, J. R. MacAllister, R. S. Aller, W. A. Pennington, and R. A. Shattuck. Seated, from left, are: C. T. Patterson, R. L. Manier, F. C. Rabb, National President R. L. Wilson, Secretary W. H. Eisenman, J. M. Hutton, W. F. McNally, S. C. Spalding, and Clifford H. Parmelee

New Carolinas Chapter's Officers

Shown Above Are Howard F. Blackwood, Secretary, and Albert R. Fairchild, Chairman, of the Newly Organized Chapter of the American Society for Metals, the Carolinas Chapter, Whose Members Come From the States of Virginia, West Virginia, North and South Carolina, and Georgia

The 83rd chapter of the American Society for Metals, to be known as The Carolinas Chapter, was organized on Nov. 12, 1952, at the Myers Park Country Club, Charlotte, N. C. Nineteen members or prospective members were present at this organizational meeting. A. R. Fairchild, who was elected temporary chairman during the meeting, explained the purposes and aims of the Society to the new members, and R. A. Shattuck of the Philadelphia Chapter explained some of the important features of organizing a chapter.

A discussion on the selection of a name for the new chapter was led by H. F. Blackwood, Jr., and it was decided that "The Carolinas" would be used. The name was taken from the original name given to the region which now includes the states of Virginia, West Virginia, North and South Carolina, Tennessee and some parts of Georgia.

Election of temporary officers was held and the following were elected to serve until Charter Night, which will be held in June.

A. R. Fairchild, Western Electric Co., chairman; J. R. Huntley, Tool Service Engineer Co., vice-chairman; H. F. Blackwood, Jr., Western Electric Co., secretary; A. B. Cooper, Edgcomb Steel Co., treasurer; and P. A. Moody, J. J. Hairston and H. R. Tillman, all of Western Electric Co., W. L. Cason of R. J. Reynolds Tobacco Co., E. R. Talone of J. P. Clark Co., and W. H. Brinkley were elected directors.

The first meeting of The Carolinas Chapter will be held at the Hotel Robert E. Lee in Winston-Salem, N. C., on Jan. 23. E. E. Thum, editor of *Metal Progress*, will give a talk on "Metallurgical Considerations of Atomic Energy".

A.S.M. Conference on Refractory Materials

A Confidential Conference on Refractory Materials for High-Temperature Applications sponsored by the American Society for Metals was held in Cleveland on Nov. 24-25, and consisted of four basic sessions. This meeting was held to provide an opportunity for the presentation and discussion of classified information that qualified engineers need to know in the performance of their jobs and in the best interests of national defense. This Conference was open to ASM members and others who filed advance security qualifications.

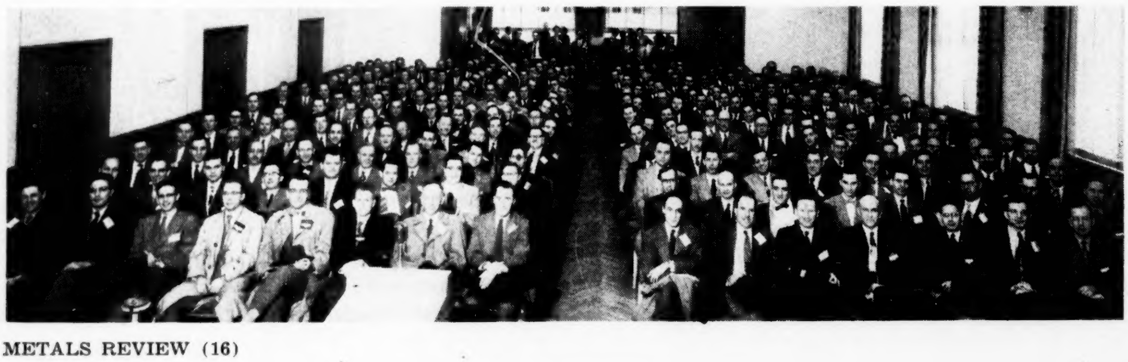
The first session on "Molybdenum and Its Alloys" brought forth considerable discussion on the use of molybdenum in high-temperature applications and methods of protecting it against oxidation. W. Baldwin, Jr., Case Institute of Technology, was chairman.

The second session on "Ceramics and Intermetallics" (W. Duckworth, Battelle Memorial Institute, chairman) led to discussion on the future of ceramics and pure intermetallic bodies. Thermal expansion and thermal shock properties of these materials were stressed.

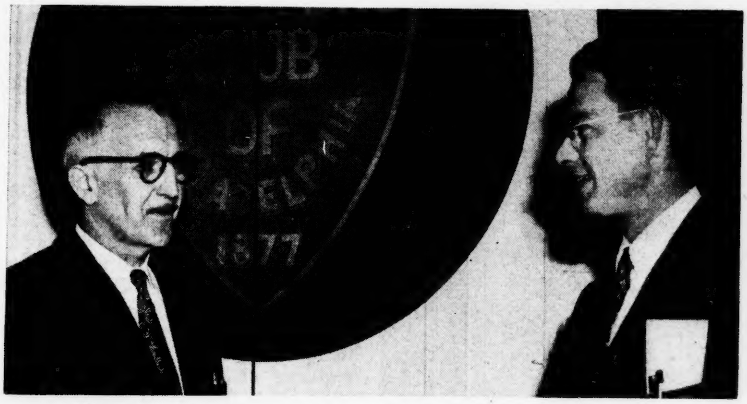
The session on "Use and Application of Refractory-Type Materials for High - Temperature Applications" (Paul F. Nay, Chief of Aeronautics Branch, U. S. Air Force, chairman) brought forth discussion on problems and advantages involved in use of these materials. The last session dealt with "Use of Binder Metals for Ceramics and Intermetallics" (John Norton, Massachusetts Institute of Technology, chairman).

A total of 398 technical personnel representing 200 companies and research organizations attended the Conference. Publication of papers and discussions is contemplated and distribution will be through A.S.T.I.A., U. B. Bldg., Dayton, Ohio, to properly cleared organizations. Roger A. Long chief, metallurgical branch, N.A.C.A., was committee chairman of the Conference.

Members of the American Society for Metals Shown in the Auditorium of the Administration Building Before Going on Tour of the Lewis Flight Propulsion Laboratory During the Conference on Refractory Materials



Joint ASM-AFS Meeting in Philadelphia



The Philadelphia Chapter A.S.M. and the Local Chapter of the American Foundrymen's Society Held a Joint Meeting in October. Shown here are, from left: Arnold Craft, chairman, Philadelphia Chapter A.F.S.; and A. M. Bounds, chairman, Philadelphia Chapter. C. Winte and E. M. Schrock, guest speakers, spoke on "Quality Control in the Foundry"

Reported by Charles C. Mathews
Joseph T. Ryerson & Son, Inc.

The Philadelphia Chapter A.S.M. and the local chapter of the American Foundrymen's Society held a joint meeting in early October. Henry C. Winte, Florence Pipe Foundry and Machine Co., and Edward M. Schrock, Lukens Steel Co., were guest speakers at the meeting.

"Quality Control in the Foundry" has finally come of age and looks as though it is here to stay, according to Mr. Winte. Price consciousness of customers is forcing effective quality control by reduction of scrap and improved casting quality.

Although the quality control unit must cooperate closely with various operating departments, experience has indicated that the most effective organization of this unit is to have it separate and distinct from all other departments and handling the one function only. Quality control can point out where and how quality should be improved, but this information pays off only after an interested foundry worker has been re-educated. A quality incentive plan is suggested to stimulate the necessary interest on the part of the worker.

"Quality Control, Statistical Methods and Steel" were discussed by Mr. Schrock. He described quality control as that which is necessary to obtain repetition of known and desirable characteristics. Four factors should be taken into consideration for this purpose:

1. A combination of tests must be used—no one test is sufficient.

2. Cost of control must justify economy obtained.

3. Statistical methods must be used to evaluate test results. (This is important since statistics are like some bathing suits—what they reveal is suggestive and what they conceal is vital.)

4. Customer satisfaction is imperative.

Quality control and inspection form an endless cycle similar to the chicken and the egg. We must find what we have by inspection and use that knowledge to control what we will produce and then find out what we have produced, by inspection again.

Mr. Schrock closed his talk by showing slides to illustrate frequency distribution and sampling tables.

Case Reviews Salt Bath Heat Treatment Before Texas Chapter

Reported by Guy V. Bennett
Materials and Process Engineer
Douglas Aircraft Co., Inc.

In a talk before the November meeting of the Tulsa Chapter, E. N. Case of the American Cyanamid Co. outlined ways in which recent salt bath developments have eased problems encountered in heat treating quality steel parts. Mr. Case is sales supervisor of the metal chemicals group of Cyanamid's Industrial Chemical Division.

His talk, entitled "Salt Bath Heat Treatment", included a general discussion of techniques and equipment for using case hardening, neutral hardening, and molten salt baths.

Mr. Case began his discourse with a knot-in-the-handkerchief trick exemplifying the "knotty" problems of heat treating. He explained that there are many advantages to using salt baths as a heating medium, the more important being rapid heating, uniformity of heating, elimination of the necessity of atmosphere control, buoyancy effect (minimizing distortion), selective carburization, isothermal treatments, and scale-free work. Two important disadvantages cited were the necessity for removal of salt from the work and the toxic ingredients contained in some salts.

The indiscriminate use and mixing of salts were discussed in detail. Mr. Case pointed out the possibility of violent reactions that might occur if due caution is not exercised, and suggested that the supplier be consulted on new applications.

The three basic types of salts, those that cause a change in surface characteristics of the work, those that do not affect the surface, and the special-purpose salts for fluxing, removal of scale and surface coatings, were discussed.

Three isothermal salt bath heat treatments—cyclic annealing, austempering, and martempering—were described. Inasmuch as salt may be carried from one bath to another in the austempering and martempering processes, it is imperative that the two salts being used be miscible.

Specific examples of parts successfully treated in salt baths were described, together with the treatment used. Processes to save time and simplify operations were outlined.

Minnesota Hears Queneau on Melting Stainless Steels

Reported by A. Bowers
Minneapolis-Moline Co.

B. R. Queneau, chief metallurgist of the Duquesne Works, United States Steel Co., gave an illustrated talk on "The Melting of Stainless Steel" at the November meeting of the Minnesota Chapter.

Experiments with bottled oxygen for the production of stainless steel were made as early as 1930, Dr. Queneau stated. It was not until the introduction of tonnage oxygen in the 1940's that large quantities of stainless scrap could be used in producing stainless steels. The amount of oxygen needed is dependent upon the desired carbon content. Twice as much oxygen is used to make heats to a carbon content of 0.07% as is used to meet a specification of 0.12% maximum carbon.

Recent shortages of materials have made it difficult to keep within specifications. For instance, to keep phosphorus below 0.03%, the charge must contain less than 0.50% stainless scrap, and stainless steel turnings have a tendency to raise the sulphur content. In titanium-stabilized grades, close control of the titanium content is required to prevent undue conditioning of the slabs.

Student Receives Science Award

Henry C. Fuller, Jr., Winner of a First-Place Award in the Science Achievement Competition Sponsored by the American Society for Metals, Is Shown as he Received the Award at a Student Assembly in November. With him are, from left: Harold Wierks, Shorewood High School Science Department, his sponsor; Ira C. Davis, University of Wisconsin National Science Teachers' Association representative; and Elmer Gammeter, vice-chairman of the Milwaukee Chapter. (Photo by Mark Wallesz)

Henry C. Fuller, Jr., a senior at Shorewood High School, Milwaukee, was presented a first-place award for Science Achievement in the competition sponsored by the American Society for Metals and conducted by the National Science Teachers' Association, at a student assembly in November. The award was based on Henry's development of an electrical analyzer for the carbon content of steel. This analyzer has been proven to be acceptable for commercial use. The entire project was constructed in Henry's own home laboratory. He was sponsored by his science teacher, Harold Wierks.

The award of $200 was presented to Henry by Elmer Gammeter, vice-chairman of the Milwaukee Chapter A.S.M. An additional award of $100 was given to the science department of the Shorewood High School.

North Texas Hears Talk on Aids to Better Grinding

Reported by John M. Turbitt
Sales Engineer, Metal Goods Corp.

Leo P. Tarasov of the Norton Co., Worcester, Mass., spoke before the North Texas Chapter in October in Fort Worth. Approximately 50 members and guests were present to hear Dr. Tarasov speak on "Metallurgical Aids to Better Grinding".

The important points stressed by Dr. Tarasov, with regard to good grinding technique, included careful study of wheel wear, power consumption, use of the right grinding oils, grinding sensitivity, minimization of heat, and above all, the right type of grinding wheel for the part in question.

Closer collaboration by the metallurgist and the tool engineer in solving grinding problems was also emphasized. The metallurgist and the tool engineer can usually solve the majority of grinding problems provided joint effort is applied, rather than each individual following his own course and working alone.

The grindability of titanium and the troubles encountered in its grinding were also discussed. Dr. Tarasov stated that the increase of vanadium in high speed steels has a serious effect on grindability. Numerous slides were utilized to depict actual grinding problems and to show different remedies and cures.

Factors Influencing The Ideal Design of Manufactured Parts

Reported by A. D. Carvin
Joslyn Stainless Steels

The November meeting of the Fort Wayne Chapter featured Charles Lipson, consultant from Detroit, who gave a talk on the "Strength of Manufactured Parts as Affected by Design."

Dr. Lipson stated that an ideal design is one that is just good enough to do the job—that is, it is a design that makes the part just strong enough and not too heavy in weight, and one that gives proper balance to stress and strength. Nominal stresses, stress concentrations, and endurance limits must be considered when working for an ideal design.

The endurance limit in fatigue loading is an important factor in designing the part that is just good enough. In some cases, stress concentrations have even been reduced by reducing metal weight at certain points. Another factor to be considered is that the tensile strength and the fatigue strength of materials are affected by the cross sectional area. The smaller the cross sectional area, the greater the tensile and fatigue strengths.

Other factors besides design can affect the strength of a part. For example, cold straightening of steel parts, such as axles, lowers the fatigue strength. Subsequently shot-peening the surface of these same parts increases the fatigue strength to about twice that of the unstraightened parts, as in forged axles.

In hardened steels the fatigue strength is much improved by grinding and polishing the surface, while in steels of low hardness the fatigue strength is little improved by polishing the surface. Therefore, usually, the polishing operation should be eliminated on steels of low hardness for economic reasons.

Conference Scheduled

A citizen's conference on the conservation and development of natural resources to be held in Washington in cooperation with the White House Mar. 25-27—the first of its scope since 1908—has been announced by Horace M. Albright, president of Resources for the Future, Inc., a nonprofit corporation established to support education and research in this field.

President-elect Dwight D. Eisenhower has declared his intention to join in the call for the citizens' conference. "It is high time," he said, "that the conservation conference of 1908 should be reborn in a midcentury setting".

The Resources for the Future, Inc., corporation will undertake "long-range programs of research and education to assure the resources essential to the progress, vigor, and security of the Nation".

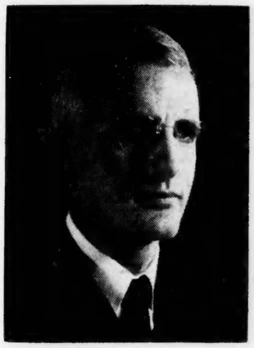
Acquires New Plant

The Park Chemical Co., Detroit manufacturer of heat treating materials and automotive chemicals, has acquired new manufacturing and warehousing facilities in Philadelphia. T. J. Clark, general manager of Park's Eastern Division, will have complete charge of its operation, with C. H. Eisler as plant manager.

Battelle Assigns New Technical Abstracter

Stewart J. Stockett has been named as technical abstracter at Battelle Memorial Institute. He succeeds W. W. Howell who has accepted a position with *Chemical Abstracts* where he will do metallurgical editing and indexing work. Mr. Stockett will be in charge of the abstracting work done at Battelle for the A.S.M. Review of Metal Literature as well as the *Battelle Technical Review*.

Mr. Stockett received his B.S. degree in chemical engineering from Indiana Technical College in 1940. After graduation his part-time job as an analytical chemist with the Joslyn Manufacturing Supply Co., Fort Wayne, Ind., was expanded to a full-time position. In 1941 he became a metallographer in the Works Laboratory of the General Electric Co. in Fort Wayne. In 1945 he joined the staff of Battelle Memorial Institute as a metallurgist. For the past eight years he has been doing research on various metallurgical projects at Battelle, particularly those connected with mechanical testing and allied fields.



Stewart J. Stockett

He joined the American Society for Metals in 1941, and helped organize the Fort Wayne Chapter. He served as a member of the Chapter's first executive committee.

Schaefer Details the Manufacture of Large Steel Forgings

Reported by Philip Storer
Hill Chase Steel Corp.

National Officers' Night during the October meeting of the Baltimore Chapter featured A. O. Schaefer, recently elected A.S.M. trustee, who gave a talk on "The Manufacture of Large Steel Forgings". He illustrated his talk with slides showing steps in manufacturing forgings.

Mr. Schaefer confined his talk to open-die forgings of such great size that very few companies have either the facilities or the experience for making them. One of the reasons that these large products are forged is that no other successful method has been found for handling the size and shape required. Over a long period of time no substitute has been so reliable. With large forgings it is also possible to obtain test results which accurately indicate the reliability of the product.

Some of the products discussed and illustrated by Mr. Schaefer were pressure vessels used in the chemical industries, hardened and ground rolls used in rolling all types of metals as well as paper and plastics, rotors, such as the steam turbine used in ships, shafts, gear rings used in ship propulsion, press cylinders, turbine bucket wheels, gun barrels, and hammer rams and anvils.

The speaker illustrated how hundreds of tons of molten metal were converted into a finished forging machined to close tolerance.

Tells Refractory Failure Story at Northern Ontario

Reported by J. B. McNichol
Metallographer
Algoma Steel Corp., Ltd.

The Northern Ontario Chapter heard Fred W. Schroeder, chemical engineer of the A. P. Green Firebrick Co. of Mexico, Mo., at the October meeting.

A film entitled "The Story of Modern Refractory", preceded the talk. Different types of clay processing at the A. P. Green Co. were shown, the main methods being the dry press process, the stiff mud process, and hand molding. The production of a number of specialty products, including insulating firebrick, was also

Mr. Schroeder's talk, "Refractory Failures", dealt with the reasons for brick failures and suggestions for their correction. Five causes of failure were stressed—furnace design, type of refractory, operating practice, quality of the refractory, and workmanship. Mr. Schroeder stated that both good chemical composition and good operating conditions are required for satisfactory service in most types of refractories. Of special interest to the steel industry was a new method, outlined by Mr. Schroeder, for determining if a certain type of firebrick would be suitable under a given set of operating conditions.

Welding Contest Announced

The Resistance Welder Manufacturers Association has announced its annual Prize Paper Contest for outstanding papers dealing with resistance welding subjects. Awards include a first prize of $750, a second of $500 and a third of $250. Papers from a university source are eligible for a $300 first prize and a $200 second prize. Undergraduates may submit papers for a $250 prize.

The contest is open to anyone in the United States, its possessions and Canada. Judges will be appointed by the American Welding Society and awards will be made at the 1953 fall meeting of the Society.

Complete details may be obtained by writing to the Resistance Welder Manufacturers Association, 1900 Arch St., Philadelphia 3, Pa.

Manitoba Hears Melting Practice Talk

F. W. Kellam, Metallurgical Engineer at the Electro Metallurgical Co. of Canada, Ltd., Gave a Description of Melting Practice and Charges Required to Produce the Different Grades of Iron at the November Meeting of the Manitoba Chapter. Shown above at the speaker's table are, from left, Jack Johnson, past chairman; Dennis Prodan and Alex McMillan, honor students from the University of Manitoba; George E. Mason, chairman; Mr. Kellam; J. Oswald, vice-chairman; and J. Tapley, secretary-treasurer of the chapter

The Physical Metallurgy of Titanium Explained at Oak Ridge

Reported by G. M. Slaughter
Metallurgist
Oak Ridge National Laboratory

"The Physical Metallurgy of Titanium" was discussed by D. J. McPherson of the Armour Research Foundation of Illinois Institute of Technology at the October meeting of the Oak Ridge Chapter.

Dr. McPherson pointed out that many Government research contracts have been sponsored for the fundamental study and determination of several titanium binary alloy constitution diagrams. Since titanium undergoes an allotropic transformation from the hexagonal close-packed structure to the body-centered cubic structure at 1625° F., it was recognized that some titanium-base alloys would be subject to heat treatment. However, it became obvious that the determination of phase diagrams would be necessary before the engineer could prescribe proper heat treating cycles.

Three basic types of constitution diagrams are prevalent in the titanium alloy systems. A simple eutectoid decomposition of the β-phase occurs in systems of the Ti-Fe type. This decompositon, however, does not easily allow the production of controlled room-temperature properties.

By additions of molybdenum or vanadium, the β-phase can be stabilized down to room temperature. A martensitic type of reaction may occur in the Ti-Mo system, thus offering excellent opportunities for heat treatment. The transformation product is acicular but is definitely not a hard structure. The standard "quench and temper" treatment, so very important in steels, is not highly beneficial with titanium alloys because of the relative softness of the resulting structure.

Aluminum additions to titanium tend to stabilize the α-phase by raising the $\alpha \rightarrow \beta$ transformation temperature. However, alloys containing above 8% aluminum are not easily hot formable because of solid-solution hardening. The oxygen in a 10% oxygen alloy will stabilize the α-phase up to the melting point of 1900° C.

The TTT relationships in the titanium - molybdenum system have been studied rather extensively. Ms temperatures were determined and found to decrease with increasing molybdenum additions. Jominy-type end-quench tests were made, and the results were found to be quite different from those common in steels. Alloys containing over 1% molybdenum had peak hardnesses occurring at some distance from the quenched end. This indicates that some change is resulting from cooling rates which are slower than those at the quenched end of the test bar.

D. J. McPherson (Right) of the Armour Research Foundation of Illinois Institute of Technology Addressed the Oak Ridge Chapter in October on "Physical Metallurgy of Titanium". Shown with Dr. McPherson is W. J. Fretague, Oak Ridge National Laboratory, technical chairman of the meeting

Dr. McPherson also stated that some titanium alloys, such as the 11% molybdenum alloy, exhibit useful age hardening tendencies. Some aluminum and aluminum-molybdenum alloys have more desirable creep properties than the more common stainless steels.

A.S.M. to Collect Facts and Figures on Metallurgical Education

The American Society for Metals is currently in the process of collecting statistical information on the educational facilities in the metallurgical field. These statistics will be made available to the metals industry and to the educational institutions as soon as they are completed.

The plan includes keeping an up-to-date tabulation of the facts covering students enrolled in metallurgical courses, programs organized by the schools, undergraduate and graduate degrees awarded, as well as facts relating to the industrial production picture and its effects on students.

Opens Branch Sales Office

The Chemical Corp. of Springfield, Mass., has announced the opening of a midwestern branch sales office in Chicago. The Chemical Corp. makes Luster-On conversion coatings ,and PLA-TANK resin-bonded glass laminate tanks, hoods, ducts and pipe.

Australian Institute of Metals to Hold Congress

Arrangements have been completed for the 1953 Annual Meeting and Congress of the Australian Institute of Metals, to be held in Brisbane, Queensland, Australia. The Congress will run from the 25th through the 29th of May 1953.

Technical sessions will include papers on "Chain Making", and "Rare Metals—Their Production and Utilization". A. S. M. members are cordially invited to attend and participate in the meetings.

Texas Industrial Growth Explained

"The Industrial Development of the Fort Worth-Dallas Area" Was the Topic Discussed at the Annual Sustaining Members Night Held by the North Texas Chapter in November. Berl E. Godfrey, center, president of the Forth Worth Chamber of Commerce and chairman of the Fort Worth-Dallas Industrial Development Committee, was the guest speaker. Reading from left are: John M. Turbitt, sales engineer, Metal Goods Corp., secretary; Fred E. Stanley, metallurgist, Consolidated Vultee Aircraft Corp., chairman; Berl E. Godfrey; Kenneth Delaplaine, chief engineer, Orand Buick Co., vice-chairman; and Boyd Dominy, president of Dominy Heat Treating Corp., treasurer

Talks on Midwest Research Institute

Shown at the November Meeting of the Kansas City Chapter Are, From Left: H. DeWitt Beeson, Program Chairman; M. H. Thornton, Associate Director for Chemistry, Midwest Research Institute, Speaker; J. G. Cametti, Chapter Chairman; and P. L. Bidstrup, From the Institute. Dr. Thornton spoke on the "Development and Growth of the Midwest Research Institute During the Past Few Years". (Photograph by C. P. Kenyon, Sheffield Steel Corp.)

Reported by Kenneth E. Rose
University of Kansas

The Kansas City Chapter heard M. H. Thornton, associate director for chemistry, Midwest Research Institute, speak on the "Development and Growth of the Institute During the Past Few Years."

Midwest Research Institute was established in 1945 to serve the 6-state area around Kansas City. It now employs approximately 175 workers of widely diversified talents and is on a sound, self-supporting economic basis.

Dr. Thornton pointed out that like most modern research organizations, Midwest depends on carefully planned programs rather than upon the "stroke of genius" that was formerly considered to be essential to discovery of new scientific concepts. Genius is still useful, but research can be successfully carried out by ordinary people, properly supervised and guided.

Several colored slides illustrating the facilities of the research laboratories were shown.

Talks on Cast Iron

Reported by Reed O. Elliott
Los Alamos Scientific Laboratory

The complex field of "High-Strength Cast Irons" was discussed by Tracy C. Jarrett, consulting metallurgist in Denver, at the first meeting of the 1952-53 reason of the Los Alamos Chapter in October.

Dr. Jarrett emphasized the economic as well as the metallurgical considerations involved in the production of cast irons that have high tensile and strength, and good wear resistance properties.

Milwaukee Completes 20th Lecture Series

The Milwaukee Chapter just completed a series of five educational lectures on the "Practical Approach to Metallurgical Problems". The course, the 20th to be given by the Milwaukee Chapter, featured prominent metallurgists from all over the country, who spoke on the following subjects:

Raw Materials, Their Procurement and Control, by M. J. Day, manager of Materials and Process Division, Armour Research Foundation.

Practical Testing and Control, by Scott L. Henry, assistant director of metallurgical research, A. O. Smith Corp.

Heat Treating Equipment, Its Choice and Operation, by H. J. Gregg, industrial engineer, Surface Combustion Corp.

Special Heat Treating Processes, by Norman O. Kates, metallurgist, Lindberg Steel Treating Co.

Materials, Process and Designs, by Frank T. McGuire, manager of materials engineering department, Deere & Co.

Kennametal Opens Plant

Announcement has been made of the opening of Canada's first refinery for the production of pure tungsten carbide directly from tungsten ore. The refinery, a branch of Kennametal Inc., is to be known as the Macro Division of Kennametal Inc., and is located at Port Coquitlam, B. C.

Men, Metal and Metallurgy Subject of Talk in Akron

Reported by W. A. Schaefer
H & M Metal Processing Co.

George W. Hinkle, stainless steel metallurgical engineer for Republic Steel Corp., central alloy district, gave the address at the November meeting of the Akron Chapter.

He illustrated his talk "Men, Metals, and Metallurgy" with movies, and discussed the history, types and uses of stainless steel. His talk included considerable information on the new types of stanless which have been developed because of the nickel shortage, and the high-temperature requirements of jet engine parts.

Past Chairmen Meet in Worcester

Worcester Chapter Held Past Chairmen's Night During Its November Meeting. Past Chairmen present were, standing, from left: Carl Johnson, Worcester Polytechnic Institute; P. A. Porter, Morgan Construction Co.; C. C. Tucker, Reed & Prince Mfg. Co.; Lloyd Field, Greenman Steel Treating Co.; W. C. Searle, Reed & Prince Mfg. Co.; P. F. Prau, manufacturer's representative; R. A. Johnson, Wickwire-Spencer Steel Division; V. E. Hillman, Crompton & Knowles Loom Works; R. I. Belmont, Bay State Abrasive Products Co.; J. A. King, Carborundum Co.; Warren Baker, Draper Corp.; and O. R. Kerst, E. F. Houghton & Co. Seated, from left, are: Leo P. Tarasov. Norton Co.; W. J. Johnson, Massachusetts Steel Treating Corp., chairman; J. W. Gulliksen, Worcester Pressed Steel Co.; John Chipman, past national president; and C. M. Inman, chairman emeritus of the Chapter. Dr. Chipman spoke on the national activities of A.S.M., particularly the educational program (Reported by C. W. Russell)

CHAPTER MEETING CALENDAR

CHAPTER	DATE		SPEAKER	SUBJECT
Baltimore	**Feb. 16**	Engineers Club	**J. E. Burke**	Recrystallization and Grain Growth
Boston	**Feb. 6**	Hotel Shelton	**R. Wilson**	National Officers' Night
British Columbia	**Feb. 12**			Plant Visit
Buffalo	**Feb. 12**	Sheraton Hotel	**G. Ellinger**	Iron Artifacts
	Feb. 13	Sheraton Hotel		Annual Supper Dance
Calumet	**Feb. 10**	Phil Smidt	**J. B. Austin**	Magnification in Time
Canton-Massillon	**Feb. 3**	Mergus Restaurant		Non-Technical Meeting
Carolinas	**Feb. 19**	Greensboro, N. C.	**S. McCaulley**	Silver Soldering
Chicago	**Feb. 9**	Furniture Club	**J. Y. Riedel**	Trouble Shooting Tools and Dies
Cincinnati	**Feb. 12**	Eng. Soc. Hqd.	**G. Linnert**	New Developments in Welding Stainless and Heat Resisting Steels
Cleveland	**Feb. 2**	Hollenden Hotel	**T. E. Eagan**	Nodular Cast Iron
Columbia Basin	**Feb. 24**	Richland Public Library	**A. Finlaysen**	
Columbus	**Feb. 4**	Broad St. Church of Christ	**Leo Epstein**	Engineering Materials As Related to Nuclear Power
Dayton	**Feb. 11**	Engineers Club	**C R. Wilks**	Heat Resistant Alloys
Detroit	**Feb. 9**	Rackham Bldg.	**R. L. Wilson**	Developments in Alloy Constructional Steel
Hartford	**Feb. 10**	The Hedges, New Britain	**J. C. Redmond**	Engineering Properties of Cemented Carbides
Indianapolis	**Feb. 16**	McClarney's Restaurant	**H. Brown**	Stainless Steel and High-Temperature Alloys
Inland Empire	**Feb.**			Plant Tour
Kansas City	**Feb. 18**	Benish Restaurant	**C. E. Betz**	Nondestructive Testing With Penetrants
Lehigh Valley	**Feb. 6**	Hotel Traylor	**J. S. Marsh**	Steelmaking
Los Alamos	**Feb. 10**		**S. P. Newberry**	Recent Developments in Microradiography
Los Angeles	**Feb. 26**			
Louisville	**Feb. 3**	Korfhage's Tavern	**J. F. Kahles**	Metallurgy and Machinability
Mahoning Valley	**Feb. 14**	Post Room, V.F.W.		Valentine Party
Manitoba	**Feb. 19**			Ladies' Night
Milwaukee	**Feb. 17**	City Club	**D. I. Brown**	Our Iron Ore Outlook
Minnesota	**Feb. 19**	Covered Wagon	**H. E. Shepard**	Die Castings
Montreal	**Feb. 2**	Queens Hotel	**L. P. Tarasov**	Metallurgical Aspects of Grinding
New Haven	**Feb. 19**	Actors Colony Inn, Seymour	**R. W. Tuthill**	Automatic Inert Gas Welding
New Jersey	**Feb. 16**	Essex House Hotel	**Herman Hanink**	Titanium—Applications and Fabrication
New York	**Feb. 9**	Schwartz's Restaurant	**E. M. Wise**	Precious Metals
Northern Ontario	**Feb. 18**		**O. Pearson**	Rail Steel
Northwestern Pennsylvania	**Feb. 26**	Kepler Hotel, Meadville	**John Niemeyer**	Color Photography in Industry
Notre Dame	**Feb. 11**	Engineering Bldg.	**H. B. Knowlton**	Boron Steels
Oak Ridge	**Feb. 18**	K. of C. Hall	**W. T. Bean**	Stress Analysis and Interpretation of Results
Ontario	**Feb. 5**		**John Chipman**	Steelmaking
Oregon	**Feb. 20**	Oregon Chain & Saw Co.		Plant Visit
Ottawa Valley	**Feb. 3**	Phys. Met. Res. Lab.		Ladies Night
Penn State	**Feb. 3**	State College	**J. S. Marsh**	Steelmaking Processes
Peoria	**Feb. 9**	Legion Hall, Morton	**H. B. Knowlton**	Boron and Other Low Alloy Steels
Philadelphia	**Feb. 27**	Engineers Club	**R. E. Zimmerman**	Steel Industry in the East
Pittsburgh	**Feb. 12**	Schenley Hotel	**F. L. LaQue**	Corrosion in Action
Purdue	**Feb. 17**	Purdue Union	**E. O. Dixon**	Grain Flow and Directional Properties of Closed Die Forgings
Rhode Island	**Feb. 4**	Engineering Society	**C. G. Johnson**	New Powder Metallurgy Applications
Rockford	**Feb. 25**	Faust Hotel	**S. Epstein**	Embrittlement of Steel
Rocky Mt.	**Feb. 20**	Denver	**P. Payson**	Treatment of Steel
Pueblo Group	**Feb. 19**	Minnequa Club	**P. Payson**	Treatment of Steel
Rome	**Feb. 3**	Elks' Club	**M. Cohen**	Heat Treatment of Steel
Saginaw Valley	**Feb. 10**	Frankenmuth	**R. L. Wilson**	Present Trends in High-Temperature Steels
Southern Tier	**Feb. 9**	Hotel Clinton	**David Sicklesteel**	Automatic Transmission
Springfield	**Feb. 16**	Ivy House	**Peter Payson**	Hardenability of Steel
St. Louis	**Feb. 20**	Forest Park Hotel	**Panel Group**	Steel Selection and Heat Treat Problems
Syracuse	**Feb. 3**	Onondaga Hotel	**C. R. Austin**	Heat Treating and Engineering Applications of Meehanite Irons
Texas	**Feb. 3**	Ben Milam Hotel	**J. F. Lincoln**	Incentive Management in the Metals Industry

Toledo	**Feb. 12**	Maumee River Yacht Club	**C. Lipson**	Why Machine Parts Fail
Tri-City	**Feb. 3**	Rock Island Arsenal	**N. A. Sauter**	Lubrication in the Farm Implement Industry
Tulsa	**Feb. 4**	Michaelis Cafeteria	**R. E. Miller**	X-Ray for Welding
Utah	**Feb. 24**	Newhouse Hotel	**Peter Payson**	Tool and Die Steels
Warren	**Feb. 12**	El Rio	**T. W. Merrill**	Vanadium in the Steel Industry
Washington	**Feb. 9**	Naylor's Restaurant	**S. L. Hoyt**	Industrial Research as an Industry Tool
Western Ontario	**Feb. 13**	Cobblestone Inn, London	**R. M. Craig**	Film-Aluminum Co. of Canada
West Michigan	**Feb. 16**	Elks' Club, Grand Rapids	**W. J. Campbell**	Editorial Night
Wichita	**Feb. 17**	K. of C. Hall	**C. Bremer**	Cleaning Aluminum for Spot Welding
Worcester	**Feb. 11**	Hickory House	**O. J. Horger**	Relationship of Metallurgy and Design
York	**Feb. 11**	West York Inn	**H. F. Reid, Jr.**	It Isn't Mud

Worcester Gives Course On Materials Selection

"Selection of Engineering Materials for a Particular Job" is the title of the series of four lectures to be presented by the Worcester Chapter's educational committee during March and April 1953.

The aim of this year's program is to provide the Man in the Shop with a simple foundation of How-When-Where and Why engineering materials are selected for a particular job. The lectures will be at a practical level and will include consideration of such factors as application, advantages, limitations, properties, cost and design. The principal engineering materials to be discussed on successive Monday evenings at Alden Memorial Auditorium are as follows:

March 23—**Forgings and Stampings**
March 30—**Cast Iron and Cast Steel**
April 6—**Production Steels**
April 13—**Toolsteels**

Indian Consulting Service

P. E. Mehta, consulting engineer for metallurgical, geological and mining problems in Calcutta, India, is soliciting aid from consulting metallurgists in the U. S. to help establish a company of consultants to advise, design and execute projects in India and southeast Asia.

Mr. Mehta is presently working on a plan for a completely mechanized port for loading minerals for export, in particular iron and manganese ores. If any A.S.M. members are interested, please write directly to: P. E. Mehta, 14A, Roy Mansions, Elgin Rd., Calcutta 20, India.

Alcoa Adds Plant

The Aluminum Co. of America has announced plans to build a modern new fabricating plant in the Lancaster (Pa.) area for production of aluminum screw machine products, fasteners, rivets and nails.

Increasing ALCOA's ability to make sheet, impact extrusions and foil will help meet defense requirements for these products. It is part of the company's long-range plan for meeting growth in normal civilian markets.

Springfield Holds Joint Meeting With ASTE-ASME Chapters

Reported by Howard E. Boyer
Chief Metallurgist
American Bosch Corp.

The Springfield Chapter held a joint meeting with the Springfield Chapter of A.S.T.E. and A.S.M.E. during October. The entire group were guests of the Westinghouse Electric Corp., East Springfield Works. A plant visitation and dinner preceded the technical talk on "Inert-Gas-Shielded Arc Welding", delivered by Edward Davis, staff supervisor, Westinghouse Electric Corp., East Pittsburgh.

Mr. Davis discussed the basic principles of shielded arc welding and its rapid advancement during the past few years. While helium was originally employed for the shield, argon has replaced it to a great extent due to the difference in heat conductivity and lower cost.

The use of argon has greatly expanded the useful field of shielded arc welding. For example, aluminum weldments are now made on a production basis, whereas it was virtually impossible to weld aluminum with a helium shield because lack of heat conductivity caused excessive melting.

Section thicknesses which can be successfully welded by this method have gradually increased, so that sections up to ¼-in. are welded regularly, and in some instances even greater sections are welded.

Shielded arc welding is now the most popular method for joining stainless steels, though the process must be developed carefully for each application. If the fused metal is not well protected by the gas shield, there is danger that both oxides and nitrides will form and seriously impair the quality of the weld.

Tells How Materials Handling Is Related To Net Profits

Reported by Glenn F. Whiteley
Heppenstall Co.

According to James Tinlin, New York branch manager for Yale & Towne Manufacturing Materials Handling Division, who spoke on "Materials Handling Equipment and Its Relation to Net Profits" before the New Haven Chapter in November, techniques of moving great quantities of war materials by the armed forces used in World War II have made plain to American industry that modern materials handling methods could not only increase plant efficiency, but also result in enormous savings in handling costs. Today, management of private enterprise, particularly in heavy industry, is fully aware of the direct bearing modern materials handling has in relation to net profits.

Fundamentally there are only two methods or ways to handle materials—in single pieces by hand, or through a large number of individual pieces collected into what is known as a unit load and moved by mechanical means. There are many methods of handling unit loads and, in different industries, the size of the unit load differs greatly, depending on the material being handled. But, bascially, there is an enormous difference betwen moving one article at a time, be it a carton or drum, and moving 50-75 pieces at once.

Materials handling equipment includes hand trucks, powered industrial trucks, tractors with trailer trains, fork trucks used in conjunction with pallets, or special attachments such as clamping devices, cranes and hoists, and conveyors.

The proper application of the correct equipment for each particular job, as determined by materals handling engineers, and constant improvements in equipment and techniques promise greater savings in future materials handling costs.

Wilson at Joint Missouri Meeting

A. S. M. President Ralph L. Wilson Spoke on "Applications and Developments in Alloy Constructional Steels" Before the Joint Meeting of the St. Louis and Missouri School of Mines and Metallurgy Chapters in November. Shown at the speaker's table are, from left: A. W. Schlecten, professor, and Curtis L. Wilson, dean, of the Missouri School of Mines; Martin E. Huether, Revere Copper & Brass Inc., vice-chairman; Mr. Wilson; Dr. Eppelsheimer, Missouri School of Mines; and R. C. Rueff, Nixdorff-Krein Manufacturing Co., executive committee. (Reported by J. Turk, Emerson Mfg. Co.)

Oak Ridge Offers Course in Reactor Technology

Applications for admission to the fourth season of the Oak Ridge School of Reactor Technology, operated for the U. S. Atomic Energy Commission by Union Carbide & Carbon Corp., must be submitted before March 1. Sessions begin in September of 1953. Admission is open to recent university graduates and to men of professional status sponsored by industry. Complete information and catalog may be secured by addressing the School at P. O. Box P, Oak Ridge, Tenn.

Corrosion Short Course

A 5-day short course in corrosion will be held Feb. 2-6, 1953 at the University of California, Berkeley. The course is given by the university's extension department and the departments of mechanical engineering, mineral technology and chemical engineering, in cooperation with the National Association of Corrosion Engineers.

Speakers from industrial and governmental laboratories and academic institutions will cover basic corrosion science theory and application of corrosion mitigation measures. Discussions will cover construction materials, coatings, environment, cathodic protection, corrosion testing and evaluation, equipment design, high temperature oxidation and the role of the corrosion engineer in industry.

Lehigh Plans Expansion

Plans for a building to house the world's largest vertical universal testing machine at Lehigh University, Bethlehem, Pa., have recently been announced. The 7-story brick building is expected to be ready for opening by September 1954. Selection of the site for the structure was made on the basis that it will provide good coordination of old and new facilities, ease delivery of heavy materials, in terfere least with present campus buildings, and best appearance.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Joseph Enke, Claudia Belknap, Ardeth Holmes and Members of the Translation Group

A — GENERAL METALLURGICAL

1-A. Practical Methods for In-Plant Reduction of Metal Finishing Wastes. W. L. Pinner. *Sewage and Industrial Wastes,* v. 24, Nov. 1952, p. 1432-1435.
General discussion. (A8, L general)

2-A. Timken-Detroit's New Axle and Gear Plant. Joseph Geschelin. *Automotive Industries,* v. 107, Nov. 15, 1952, p. 50-53, 94.
Production facilities at the Ohio Axle and Gear Division of the Timken-Detroit Axle Co., Newark, Ohio, including material handling, welding, heat treating, machining, and grinding. (A5, G general, ST)

3-A. Ion-Exchange Resins for Metal Recovery. A. G. Thomson. *Mining Journal,* v. 239, Nov. 14, 1952, p. 545.
A method of gold recovery which utilizes ion-exchange resins and eliminates zinc precipitation. (A8, Au)

4-A. (French.) Perspectives of the Japanese Aluminum Industry. G. A. Boudart. *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 335-337.
Figures on production and fabrication of Al in Japan and on influence on world trade. (A4, Al)

5-A. Some Experiences With Air Pollution Abatement in the Steel Industry. C. A. Bishop. *Blast Furnace and Steel Plant,* v. 40, Dec. 1952, p. 1448-1453.
Experiences with openhearths, bessemers, and blast furnaces. Cleaning of ferromanganese blast furnace gas. (A7, D general)

6-A. Triple-Threat Fume Disposal System. *Chemical Engineering,* v. 59, Dec. 1952, p. 262-263.
Tells how new installation at Kaiser Aluminum and Chemical Corp.'s Mead, Wash., plant prevents air pollution, improves working conditions, and recovers 35 tons per day of valuable dust. (A7, A8, C23, Al)

7-A. The Trostre Tin-Plate Works of the Steel Company of Wales. *Engineering,* v. 174, Nov. 21, 1952, p. 649-652.
Detailed information on various installations with special reference to the electrical equipment. (A5, F23, L17, CN, Sn)

8-A. Distribution of Tungsten and Moybdenum for the Fourth Quarter, 1952. *South African Mining and Engineering Journal,* v. 63, Oct. 18, 1952, p. 255, 257.
Statistical data. (A4, W, Mo)

9-A. Metal Processing at M.I.T. Howard F. Taylor. *Technology Review,* v. 55, Dec. 1952, p. 97-100, 124, 126.
Teaching and research activities of Metal Processing Division of Department of Metallurgy at MIT, and important part played therein by new Metals Processing Laboratory. (A9, A2)

10-A. Metals Processing Laboratory. *Technology Review,* v. 55, Dec. 1952, p. 89-92, 120, 122.
The facilities at MIT provided by Alfred P. Sloan Foundation, Inc. The new laboratory is intended to make a scientific approach to basic metal processing. (A9)

11-A. (Pamphlet.) Saving Scarce Materials. Nov. 1952. 28 pages. Anglo-American Council on Productivity, 2 Park Ave., New York 16, N. Y.; or 21 Tothill St., London, S.W.1, England.
Deals with ferrous and nonferrous metals in general and detailed discussion of material by material. Methods of conservation, labor aspect, and the long-term problem. (A general, Fe, SG-a)

B — RAW MATERIALS AND ORE PREPARATION

1-B. Fused Stabilized Zirconia Refractories. Douglas W. Marshall and O. J. Whittemore, Jr. *Chemistry in Canada,* v. 4, Nov. 1952, p. 23-28.
Uses for these refractories include linings for furnaces operating to 2500° C., setters for firing titanates, containers for steel and Pt, and resistors for oxide-resistor furnaces. Before development of this process, extensive use of Zr as a refractory had been limited by its high cost. Graphs and diagrams. 13 ref. (B19)

2-B. Development of Quebec-Labrador Iron Ore. W. H. Durrell. *Iron and Steel Engineer,* v. 29, Nov. 1952, p. 87-89.
Present extent of ore fields, method of mining, and economics involved in sale and distribution. (B10, Fe)

3-B. Radioactivity in Mineral Dressing. A. M. Gaudin. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1952, *Transactions,* v. 62, part 2, 1952-53, p. 30-41.
Some of the ways in which radioactivity can serve the mineral engineer, in research, in operative control, and in development of new mineral-separating processes. (B14, S19)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

4-B. Development of the Science of Grinding. L. E. Djingheuzian. *Canadian Mining and Metallurgical Bulletin,* v. 45, Nov. 1952, p. 658-663; disc., p. 663-666; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 384-392.
Work of present-day investigators on grinding fundamentals is submitted as grinding criteria: power, total work input, Bond's work index as a measure of comparative grinding efficiencies, work index as a function of grindability, grindability as a function of "80% passing *n*-mesh". The concept of thermodynamic criteria in grinding is formulated as a mathematical law. Tables and graphs. 19 ref. (B13)

5-B. Carbide Tipped Hammers Cut Pulverizing Costs. W. E. Fawcett. *Iron Age,* v. 170, Nov. 27, 1952, p. 114-116.
Hammers of pulverizing mills last up to 100 times longer when tipped with tungsten carbide. Over-all hammer length, essential to mill efficiency, is maintained for longer periods. Costs for replacement of hammers have been reduced while maintenance downtime has been minimized. (B13, T5, C-n, W)

6-B. Production of High Manganese Slags by Selective Oxidation of Spiegeleisen. Miles B. Royer and Russell C. Buehl. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1295-1300.
High-manganese slags of low phosphorus and iron content were produced by air oxidation of high-phosphorus spiegeleisen in a basic-lined converter. Various types of slags, or synthetic manganese ore, can be made. Photographs, tables and charts. (B21, Mn)

7-B. (German.) Problems in Sampling Ores and Concentrates. Friedrich Marr. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Oct. 1952, p. 395-400.
The sampling problem. Methods for producing analytical samples from qualitative samples. (B11)

8-B. Supplementary Tests on Cobalt Nickel Ore From Bogota Canala, New Caledonia. J. Woodcock and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and Mining Department,* University of Melbourne, Investigation No. 416, Mar. 19, 1952, 5 pages.
Extended tests on extraction of Co and Ni by leaching with aqueous SO_2 solutions. Reports a precipitation test. (B14, Co, Ni)

9-B. New Acid-Leaching Section Raises Cyprus Copper Recovery by 10%. A. W. Schlechten and J. L. Bruce. *Engineering and Mining Journal,* v. 153, Dec. 1952, p. 88-91.

Process consists of leaching 2,000 long tons every 24 hr. of minus-½-in. raw Mavrovouni ore with 4% H_2SO_4 containing 2 g. per liter ferric iron, and separating leached material into sand and slime portions. Sand portion is washed in 4 countercurrent classifiers, and slime in 4 countercurrent thickeners. Plant is located on island of Cyprus in the Eastern Mediterranean. (B14, Cu)

10-B. Substitute Chromium Sources Reduce Production Costs of Stainless Steel. Norris B. McFarlane. *Journal of Metals,* v. 4, Dec. 1952, p. 1284-1285.

Melting practices have been developed whereby chromium can be obtained from stainless scrap, high-carbon ferrochrome, and chromium silicide at a substantial saving. (B22, D general, SS)

11-B. A Process for the Recovery of Manganese From Ores. Thomas Andrew Hendrickson. *Quarterly of the Colorado School of Mines,* v. 47, Jan. 1952, p. 21-43.

Process consists of transforming Mn from its original mineralogical form to water-soluble chloride form by heating in an atmosphere of dry Cl gas. Soluble manganese chloride is leached with water, precipitated from solution as manganese hydroxide and sintered to Mn_3O_4, the final product, assaying in excess of 60% Mn. Tables and graphs. 24 ref. (B14, B16, Mn)

12-B. Stepping Stones Towards Uranium Production. *South African Mining and Engineering Journal,* v. 63, Oct. 18, 1952, p. 251, 253.

A general discussion. (B10, U)

13-B. High-Temperature Experiments With Zirconium and Zirconium Compounds. W. J. Kroll, W. R. Carmody, and A. W. Schlechten. *U. S. Bureau of Mines,* Report of Investigations 4915, Nov. 1952, 31 pages.

Experiments on decomposition of zircon, direct production of Zr alloys, reaction of metals with Zr tetrachloride, and with K-Zr fluoride, plating Zr alloys on other metals by chemical methods, smooth plating of Zr by electrolysis, fusibility of Zr-Na chloride mixtures, and production of Zr metal powder by chemical methods and by fusion electrolysis. (B14, C general, L17, H10, Zr)

14-B. Maple Mountain-Hovey Mountain Manganese Project, Central District, Aroostook County, Maine. N. A. Eilertsen. *U. S. Bureau of Mines,* Report of Investigations 4921, Nov. 1952, 118 pages.

Metallurgical investigations of ore dressing, pyrometallurgical tests, acid leaching, and volatilization as chloride. Tables, and diagrams. (B14, Mn)

C

NONFERROUS EXTRACTION AND REFINING

1-C. Monovalent Aluminum. J. P. McGeer. *Journal of Chemical Education,* v. 29, Nov. 1952, p. 534-538.

Properties of compounds and their possible use in Al production. Graphs 37 ref. (C general, Al)

2-C. Chlorine Metallurgy. W. J. Kroll. *Metal Industry,* v. 81, Sept. 26, 1952, p. 243-245; Oct. 3, 1952, p. 269-271; Oct. 10, 1952, p. 284-286; Oct. 17, 1952, p. 307-311; Oct. 24, 1952, p. 325; Oct. 31, 1952, p. 341-343; Nov. 7, 1952, p. 365-366.

Applications of Cl in metal reduction and beneficiation. Basic reactions, valency changes, purification and separation methods, chlorination of low grade chromites and Ni ores, chlorination on an industrial scale, tabulation of metal-chloride displacement reactions, hydrogen reduction of gases, solid cathode deposits, and soluble alloy anodes. 216 ref. (C4, B14)

3-C. Some Exporatory Experiments on the Formation and Contro of Magnetite During Copper Smelting Operations. E. C. Ellwood and T. A. Henderson. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1952, *Transactions,* v. 62, part 2, 1952-53, p. 55-65.

Reactions of magnetite, nature of hearth accretions, behavior of magnetite in slag, formation of magnetite during smelting operations, reduction of magnetite in converter slag, and treatment of magnetite-rich furnace hearth deposits. 12 ref. (C21, Cu)

4-C. Electrolytic Processes in Chemical and Metallurgical Industry. Principles of Electrolytic Processes. H. J. T. Ellingham. *Chemistry & Industry,* Nov. 15, 1952, p. 1115-1118.

General discussion includes electrolytic extraction, refining, and electroplating. (C23, L17, EG-a)

5-C. Electrical Conductivity of Molten Cryolite and Potassium, Sodium, and Lithium Chlorides. Junius D. Edwards, Cyril S. Taylor, Allen S. Russell, and L. Frank Maranville. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 527-535.

Improved technique developed for determination of electrical conductivity of reactive molten salts in cryolite baths used in the Hall process for production of Al. 26 ref. Graphs and tables. (C23, Al)

6-C. Approach to Melting Reactive Metals Eliminates Use of Refractory Containers. T. T. Magel, P. A. Kulin, and A. R. Kaufmann. *Journal of Metals,* v. 4, Dec. 1952, p. 1286-1288.

Two methods of induction melting without refractory crucibles developed and used at the MIT Metallurgical Project. Diagrams and photographs. (C21, Zr, Ti)

7-C. Lead Blast Furnace Gas Handling and Dust Collection. R. Bainbridge. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952. p. 1302-1306.

Selection and design of equipment and operating details in the modernized Pb blast furnace plant of the Consolidated Mining and Smelting Co. of Canada, Ltd., at Trail, B. C. Diagrams and tables. (C21, A7, Pb)

8-C. (German.) **Combustion and Reduction of Fine-Grained Substances in a Downward Airflow With Particular Application to Zinc Oxide-Coal Mixtures.** Ernst-Justus Kohlmeyer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Oct. 1952, p. 385-389.

Earlier experiments and application of the process on the plant level. New experiments for establishing the peculiarities of the process, and possibilities for large-scale application. Tables, charts, diagrams. (C21, Zn)

9-C. A Line Frequency, Coreless Induction Furnace for Melting Aluminum. K. H. Brokmeier. *Aluminium,* v. 28, Nov. 1952, p. 391-400.

Efficiency, bath movement, and working of the heat are compared with operation of core-type furnaces. Photographs and diagrams. (C21, Al)

10-C. Continuous Casting of Non-Ferrous Metals. Part III. Factors Controlling Permissible Speed of Casting. B. H. C. Waters. *Metal Treatment and Drop Forging,* v. 19, Nov. 1952, p. 474-478, 482.

Investigation of fractures and of mechanism responsible for fractures when certain maximum speeds are exceeded. Surface quality of mold and influence of lubricants. (To be continued.) (C5)

11-C. (Book.) **Electrochemical Data.** B. E. Conway. 374 pages. 1952. Elsevier Publishing Co., 445 Park Ave., New York 22, N. Y.

Besides information on pure electrochemistry, electrode potentials, solvation and ionic interaction in aqueous and non-aqueous solutions, data are included on some more quantitative aspects of applied electrochemistry. Provides modern data on electrochemistry of slags and fused melts and also on applications, both practical and theoretical, in the field of biophysics. (C23, L17)

D

FERROUS REDUCTION AND REFINING

1-D. Going to Try a Basic Lining? Here's a Guide for Refractory Selection. J. P. Holt. *American Foundryman,* v. 22, Nov. 1952, p. 63-68.

Comprehensive discussion of basic refractories for steelmaking furnaces, cupolas, and crucibles. (D general, E10, ST)

2-D. Sulphur. Importance in the Iron and Steel Industry. E. C. Evans. *Iron & Steel,* v. 25, Nov. 1952, p. 495-500.

Reviews sources of S other than that mined in Texas and Louisiana. Use of S in blast-furnace practice, desulfurization outside the blast furnace, use in steelmaking, recovery from coke-oven gas, and recovery of H_2SO_4 from waste pickling liquor. 30 ref. (D general, A8, ST)

3-D. Pollution. Problems of the Iron and Steel Industry. R. J. Sarjant. *Iron & Steel,* v. 25, Nov. 1952, p. 501-502.

Discussion is confined to pollution problems associated with manufacture of iron and steel which arise from production of smoke, fumes, and dust in blast furnaces, sintering plants, melting plants, bessemer converters, and cupolas. (D general, A7, ST, Fe)

4-D. Developing Increased Capacity at Armco's Middletown Division. G. D. Tranter. *Iron and Steel Engineer,* v. 29, Nov. 1952, p. 90-96; disc., p. 96-97.

New installations at this plant, and sequence in which a program is being carried out to provide a good balance among steel melting, rolling, and finishing capacities. (D general, F23, ST)

5-D. The Attainment of Maximum Open Hearth Production. T. J. McLoughlin. *Iron and Steel Engineer,* v. 29, Nov. 1952, p. 123-129.

Care of furnace bottom and banks, maintenance of maximum furnace temperature, charging hot-metal additions, run-off slag and lime, working heat, tapping, instruments and controls, and care of furnace. Tables and graphs. (D2, CN)

6-D. Acid Open Hearth Bottom Practice. B. B. Rosenbaum. *Industrial Heating,* v. 19, Nov. 1952, p. 2102, 2104, 2106, 2108.

Effect of chemical composition and particle size of industrial silica sands for acid openhearth furnace banks and bottoms. Data are tabulated. (D2, ST)

7-D. Stainless Steel Melting Practices Have Changed. B. R. Queneau and A. C. Ogan. *Iron Age,* v. 170, Dec. 4, 1952, p. 165-169.

Innovations introduced in stainless melting in recent years. Despite material shortages, quality has improved and heat times have been reduced. Use of stainless scrap is not recommended in making 0.03% max. C stainless. By using ferrochromium pellets, 87-92% Cr recoveries are achieved and 3-4 hr. saved in heat times over the old practice. Tables and charts.
(D general, B22, SS)

8-D. A Recent Development in Ingot Chariot Control. A. W. Leadbeater and R. B. Jamieson. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 264-267.

A solution to problem of damage to the ingot car system by ingots falling on the track and collector rails. Maintenance costs are greatly reduced, and repairs are simplified. (D9, ST)

9-D. Some Factors Affecting the Operation and Performance of Open-Hearth Furnaces. D. F. Marshall. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 315-326.

Evaluates some of the more important factors affecting the productivity and fuel consumption of openhearth furnaces. Properties of principal available fuels. Relationship between slag bulk, rate of production per hour, and fuel consumed per ton was found to be highly significant. Aspects of furnace design, such as hearth size, uptake, and checker design. A basis for combustion control is discussed in detail, with special reference to the possible advantages to be gained from faster charging. Charts and tables. 14 ref. (D2, Fe)

10-D. Electric Smelting at Bureau of Mines Seeks Utilization of Northwest Ores. R. T. C. Rasmussen. *Journal of Metals,* v. 4, Dec. 1952, p. 1273-1279.

Electric smelting research facilities comprising batch-type arc melting furnaces and a pilot plant smelter with two open-top, pit-type furnaces for continuous smelting tests. Problems and results. Recent tests indicate promise for direct smelting of manganese silicates to produce silicomanganese, with high recovery of manganese. Other projects investigated included reduction of Oregon iron ore, production of ferro-columbium-tantalum from tin slag, and production of ferrochromium. (D5, C21)

11-D. Autopour Makes Steel Pouring Easier, Safer, Better. T. H. Hoby. *Journal of Metals,* v. 4, Dec. 1952, p. 1282-1283.

An electrically controlled hydraulic apparatus for fingertip control of the pouring of steel from ladles to molds. Photographs and diagrams. (D9, ST)

12-D. Production of Spiegeleisen From Open-Hearth Slag in an Experimental Blast Furnace. Russell C. Buehl and Miles B. Royer. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1289-1294.

A three-ton per day blast furnace using blast temperatures up to 2200° F. was operated to recover manganese from openhearth slag and manganiferous iron ore. The spiegel product contained 12 to 24% Mn. (D1, Fe-n)

13-D. (German.) **Large-Scale Melting Tests in Order to Determine the Coke Consumption for Remelting Pig Iron and Scrap in the Blast Furnace.** Cornelius Wens. *Stahl und Eisen,* v. 72, Nov. 6, 1952, p. 1391-1397.

Bibliography and planning of tests, operational results, and their interpretation. Converts data obtained to a common basis of operating conditions. Coke rate for scrap and pig iron, including granulated pig iron, is determined from comparable tests using a burden composed of ore exclusively. Tables. 13 ref. (D1, B22, Fe)

14-D. (German.) **The Distribution of Phosphorus Between Iron Melts and Saturated Slags in the Temperature Range 1530-1700° C.** Wilhem Anton Fiscner and Hans vom Ende. *Stahl und Eisen,* v. 72, Nov. 6, 1952, p. 1398-1408.

Results compared with those obtained in the basic bessemer process. Relationships between O_2 contents of iron melt and slag and constitution of slags were determined. Tables, graphs, and micrographs. 26 ref. (D2, ST)

15-D. (German.) **Refining Basic Bessemer Pig Iron With Carbon Dioxide-Oxygen Gas Mixtures.** Karl Mayer, Helmut Knüppel, and Hans Jürgen Darmann. *Stahl und Eisen,* v. 72, Nov. 6, 1952, p. 1409-1418.

Blowing methods to produce rimmed steels having low N_2 contents. Storage plant for liquid CO_2 and evaporators; mixing CO_2 and O_2; blowing methods using CO_2-O_2 mixtures; N_2 and O_2 contents of steel; FeO contents of slag; properties of rimmed steels produced; and economic efficiency of the method. Diagrams, graphs, and tables. 17 ref. (D2, ST)

16-D. (Swedish.) **Desulfurizing in Basic Furnaces.** Torsten Collén and Stig Hollström. *Jernkontorets Annaler,* v. 136, No. 8, 1952, p. 317-361; disc., p. 361-374.

Desulfurizing in basic steel furnaces was studied statistically on 700 openhearth heats and experimentally in gas and oil-fired openhearth furnaces and in electric furnaces. The desulfurizing effect during refinement was mainly dependent upon basicity of slag. For reducing slags, no relation was found between ratio of S in slag and steel and basicity. Tables, graphs, and diagrams. 24 ref. (D2, ST)

17-D. The Attainment of Maximum Open Hearth Production. T. J. McLoughlin. *Blast Furnace and Steel Plant,* v. 40, Dec. 1952, p. 1435-1442.

Data from various openhearth shops are tabulated and charted. Care of furnace linings, effects of temperature and its control, charging and melting practices, instruments and controls, and a brief description of the "ideal heat".
(D2, ST)

18-D. Continuous Casting Machine Will Soon Be in Operation at Welland. *Blast Furnace and Steel Plant,* v. 40, Dec. 1952, p. 1456, 1468.

The equipment and its advantages. (D9, ST)

19-D. Seventy-One Years of Blast Furnacing At South Works. Hershel E. Kaufman. *Blast Furnace and Steel Plant,* v. 40, Dec. 1952, p. 1457-1464.

Blast furnace equipment and operation at South Works in 1881, and developments to date. (D1, CI)

20-D. Recent Experience With Basic- and Acid-Electric Steel. L. W. Sanders. *Foundry Trade Journal,* v. 93, Nov. 27, 1952, p. 611-616.

Changeover from small basic-lined electric furnace to balanced production from modern basic and acid-lined electric furnaces at a British plant. Particulars of new plant, together with details of linings, melting processes and degree of uniformity and reproducibility obtained. Photographs, diagrams, and charts. (D5, ST)

21-D. Studies in the Deoxidation of Iron. Deoxidation by Silicon. E. Ll. Evans and H. A. Sloman. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 296-300.

Preparation, microscopic examination, and analysis of a series of ingots containing various quantities of iron oxide and Si. Includes X-ray and chemical analysis of the nonmetallic residues. Inclusions may consist of two immiscible glasses, or of fayalite together with magnetite and wüstite. Photomicrographs show the various types of inclusion. The results are discussed briefly in relation to Gokcen and Chipman's recent investigation of equilibrium in molten iron. (D general, M27, Fe)

22-D. (German.) **Determination of the Heat Losses of Blast Furnaces by Measuring the Cooling Water Volume.** Alfred Send and Franz Strähuber. *Stahl und Eisen,* v. 72, Nov. 20. 1952, p. 1509-1513.

Report No. 266 of the Blast Furnace Committee of the Verein Deutscher Eisenhüttenleute. Heat losses at various sections with both fireclay and carbon brick linings were measured. Data are tabulated and charted. 10 ref. (D1)

23-D. (German.) **Factors Affecting the Life of Basic Converter Linings.** Walter Eilender and Josef Schoop. *Stahl und Eisen,* v. 72, Nov. 20, 1952, p. 1513-1521.

Report No. 514 of the Steelworks Committee of the Verein Deutscher Eisenhüttenleute. Effects of grain size of liner materials, spalling phenomena, tar characteristics, and compacting force. Charts and diagrams. 12 ref. (D3)

24-D. (German.) **The Analysis of Operating Procedures as a Basis for Measures to Improve Productivity of Iron and Steel Works.** Martin Förster. *Stahl und Eisen,* v. 72, Nov. 20, 1952, p. 1524-1531.

Report No. 239 of the Committee for Industrial Management of the Verein Deutscher Eisenhüttenleute. A study was made of the iron and steel industry and its development since the second world war. Essentials of operational analysis. Charts and tables. (D general, S12)

25-D. (Book.) **Iron and Steel.** 147 pages. June, 1952. Anglo-American Council on Productivity, 21 Tothill St., London S.W. 1, England; or 2 Park Ave., New York 16, N. Y.

Processes of iron and steelmaking; labor, services, and finance. Relative productivity in U. S. and Britain.
(D general, F general, A4, A6, Fe, ST)

26-D. (Book.) **Iron and Steel Works of the World.** H. G. Cordero, editor. 651 pages. 1952. Quin Press, Ltd., London.

Comprehensive and global review of important plants producing pig iron, raw steel, rolled iron and steel, flat steel, tinplates, etc.
(D general, F23, Fe. ST)

E

FOUNDRY

1-E. Hot Strength at Falling Temperatures: Does it Influence Hot Tear Formation? D. C. Williams. *American Foundryman,* v. 22, Nov. 1952, p. 47-50.

Hot strength of sand as it cools from pouring temperatures and a procedure for obtaining additional similar data. How strength development in the mold during increasing and decreasing temperatures may contribute to hot tears. Graphs. (E18)

2-E. Segregation During Casting Shown by Radioactive Antimony. P. J. Killaby, B. J. Taylor, and W. C. Winegard. *American Foundryman,* v. 22, Nov. 1952, p. 59-62.

Comparatively new technique of autoradiography quickly and easily

demonstrates that gravity segregation in cast metals, including Pb-Sb alloys, is minimized or eliminated by a fast cooling rate. Recommends use of radioactive tracers for studying this and other foundry problems. (E25, S19, Pb, Sb)

3-E. Casting in Cement Bonded Sand. J. B. McIntyre. *Foundry,* v. 80, Dec. 1952, p. 90-91, 269.

Use of silica sand bonded with portland cement for molding Mn bronze and Al bronze marine propellers and water-turbine runners. Advantages. (E18, Mn, Al, Cu)

4-E. Shell Molding at International Harvester Co. Garnet P. Phillips. *Foundry,* v. 80, Nov. 1952, p. 102-107, 282-292; Dec. 1952, p. 96-101, 177, 182.

Method of producing castings with relatively fine finish and within dimensional tolerances much lower than obtained by conventional green-sand molding methods. Equipment requirements for both relatively large production setups and experimental work. Equipment requirements for setting up a mechanized shell-molding unit, types of shell-making machines available, and proposed layouts for commercial production. Photographs and diagrams. (E16)

5-E. Longer Life Cast Into Modern Slag Ladle. *Foundry,* v. 80, Dec. 1952, p. 108-111, 174, 177.

Procedure for casting and finishing slag ladles. Photographs. (E11, CN)

6-E. New Method Simplifies Shell Mold Assembly. Richard Herold. *Foundry,* v. 80, Dec. 1952, p. 142, 144. (E16)

7-E. Research on Atmospheric Dust in Steel Foundries With Special Reference to the Use of Statistical Surveys. G. M. Michie and G. H. Jowett. *Foundry Trade Journal,* v. 93, Nov. 6, 1952, p. 527-535, Nov. 13, 1952, p. 563-565; disc. p. 565-569.

Use and interpretation of atmospheric dust surveys. Dust sampling and estimation and potential importance of automatic methods. Two environmental dust surveys in steel foundries were made, and data subjected to detailed statistical analysis. Results show influence on dust level of such factors as local operational process, day of week, and time of day. Statistical considerations involved in design and analysis of such surveys. Tables and graphs. 13 ref. (E general, A7, ST)

8-E. (Swedish.) **The Influence of Different Clay Bonds on the Properties of Molding Sands.** Olof Carlsson. *Gjuteriet,* v. 42, Oct. 1952, p. 157-165.

Influence of different clay bonds on properties of molding sands. Natural sodium bentonite, synthetic sodium bentonite, natural calcium bentonite, soda-treated calcium bentonite, and kaolinite clay were tested. Graphs and photographs. (E18)

9-E. What's Ahead the Next Ten Years in Casting and Molding. *American Machinist,* v. 96, Mid-Nov. 1952, p. B-B7.

Shell molding, investment casting, die casting, plastic molding, and powder metallurgy. (E general, H general)

10-E. Carbon: A New Cupola Refractory? P. Provias. *Canadian Metals,* v. 15, Nov. 1952, p. 32-34.

Advantages. Compares properties with other common refractories. (E10)

11-E. Melting and Casting Aluminum Bronzes. James G. Dick. *Canadian Metals,* v. 15, Nov. 1952, p. 36, 38.

Melting of aluminum bronzes, and history of the process. (To be concluded.) (E11, Cu)

12-E. What Constitutes Good Foundry Practice With Aluminum and Magnesium. Hale A. Clark. *Industrial Gas,* v. 31, Nov. 1952, p. 16, 26, 28.

Suggestions to achieve sound castings and avoid gas cavities, gas porosity, inclusions, cracks, macro-shrinkage, piping, hot tears, cold shorts, and segregation, intercrystalline corrosion, sweating, and surface pitting. (E25, Al, Mg)

13-E. Foundries Report on Basic Electric Arc Practices. T. N. Armstrong. *Iron Age,* v. 170, Nov. 27, 1952, p. 103-105.

A survey of 25 foundries shows trends and significant differences in melting practice. Some foundries have converted to basic furnaces while others are considering such a step. (E10, CI)

14-E. The Antioch Process. *Light Metals,* v. 15, Nov. 1952, p. 365-368.

Plaster-mold casting process and its advantages in comparison with other production methods. Emphasizes application to Al and its alloys. (E16, Al)

15-E. Porosity Due to Dross. *Metal Industry,* v. 81, Nov. 14, 1952, p. 391.

True nature of porosity. Urges securing accurate diagnosis of casting defects. Cites example of a typical Al alloy casting. (E25, Al)

16-E. Biggest in Canada: Domal's New Magnesium Foundry. *Modern Metals,* v. 8, Nov. 1952, p. 52-53.

The new Mg foundry of Dominion Magnesium, Ltd., at Haley, Ont. The 70,000-sq. ft. plant will eventually have a capacity of nearly 5 million lb. of light-metal castings per year. (E general, Mg)

17-E. Low Cost Shell Molding Machine for the Small Jobbing Foundry. *Modern Metals,* v. 8, Nov. 1952, p. 58-59.

New equipment which produces shells at a rate of 70-100 per hr. It was developed by Graduate School of Business, Stanford Univ. (E16)

18-E. (French.) **Principles and Fabrication of the "Ferodo" Hydraulic Coupling.** Marcel Avice. *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 367-374.

The casting of Al parts for the above using permanent molds and sand casting. Typical applications of the couplings. (E11, E12, Al)

19-E. (German.) **Reheat Phenomena in Steel Casting Molds.** A. Roth. *Giesserei,* v. 39, Oct. 30, 1952, p. 585-587.

Reviews the above on basis of literature, and author's observations. With proper precautions, disadvantages of phenomenon can be turned into advantages in steel casting. Diagrams. (E25, CI)

20-E. Design and Production of Shell Mold Patterns Improved. *Iron Age,* v. 170, Dec. 11, 1952, p. 172-174.

The use of cast iron, steel, and Al for patterns and the processing and treatment of molds for satisfactory service. (E16, E17, CI, ST, Al)

21-E. The Shell Moulding Process. *Machinery* (London), v. 81, Nov. 28, 1952, p. 1111-1116.

Methods employed by Polygram Casting Co., Ltd., Chiswick, London, which has carried out considerable development work in connection with applications of the process. (E16)

22-E. Segregations in Lead Bronze Bush. *Metal Industry,* v. 81, Nov. 28, 1952, p. 427-428.

Importance of melting procedure is emphasized in this example of casting trouble. Its correction necessitated attention to a number of points simultaneously. Photographs and micrographs. (E25, Cu)

23-E. (Book.) **The Brass Foundry.** 173 pages. 1951. Anglo-American Council on Productivity, 2 Park Ave., New York 16 N. Y.; or 21 Tothill St., London, S.W. 1, England.

Report of a British visit to U. S. where 21 plants were observed. (E general, Cu)

24-E. (Book—Italian) **(Handbook of Aluminum Casting.) Manuale di Fonderia d'Alluminio.** 476 pages. 1949. Ulrico Hoepli, Milan, Italy. Paper 2500 lire, Bound 3300 lire.

History of Al casting, including melting, dies, casting, finishing, casting defects, heat treatment, material testing, and analyzing. The common alloys trade-names, their mechanical and physical properties, standards, and the Italian and foreign owners of patents and licenses are tabulated. Appendix contains, besides the usual conversion tables, 884 designations of cast alloys with their composition and producers. (E general, Al)

25-E. (Book.) **Pattern Design.** Ed. 2. Henry E. Kiley and John H. Paustian. 193 pages. 1952. International Textbook Co., Scranton, Pa.

Pattern details, molding details, materials used in pattern construction, construction work and joints, design for low-cost production, pattern-department management, special designs, explanation of work required in planning pattern equipment, and problems in pattern design. (E17)

26-E. (Book.) **Yankee Iron.** 140 pages. Eastern Malleable Iron Co., Naugatuck, Conn.

An unusual book telling dramatic and moving story of development and life of Eastern Malleable Iron Co. (From review in *Iron Age*) (E general)

F

PRIMARY MECHANICAL WORKING

1-F. Operation of a 12-In. Continuous Bar Mill. A. H. Griffiths. *Iron and Steel Engineer,* v. 29, Nov. 1952, p. 55-60; disc. p. 60.

Mill described has economical roll layout. All pass sizes are in one set of rolls except for the leader and finishing rolls. Diagrams and photographs. (F23, ST)

2-F. Production of Brass and Copper Wire. Benjamin H. McGar. *Wire and Wire Products,* v. 27, Nov. 1952, p. 1178-1179.

Processing of yellow and cartridge brasses. Improvements that may eliminate some intermediate steps. (F28, Cu)

3-F. What Are the Differences in Wire Drawing Lubricants? Leon Salz. *Wire and Wire Products,* v. 27, Nov. 1952, p. 1180-1184.

Type of metal, metallurgical and physical condition of rod, and mechanics of the operation. Classification of wire-drawing lubricants includes dry granulated soaps, soap-fat paste compositions, compounded oils, petroleum greases, and graphite. (F28)

4-F. Improved Lime Bath Performance by Recirculation. Jere Y. Heisler. *Wire and Wire Products,* v. 27, Nov. 1952, p. 1185-1187, 1235.

Some of the work done on lime coatings, particularly improvements which have been accomplished through installation of recirculating lime tanks in the rod and wire mills at Sparrows Point Plant of Bethlehem Steel Co. (F28, ST)

5-F. What's Ahead the Next Ten Years in Presswork and Forging. *American Machinist,* v. 96, Mid-Nov. 1952, p. D-D11.

Press work, forging, and extrusion. (F22, F24, G1)

6-F. Turbine Blades Forged in Mid-Air. Englebert Kirchner. *Aviation Age*, v. 18, Dec. 1952, p. 6-11.
Impactor developed by Chambersburg Engineering Co., Chambersburg, Pa. (F22, AY)

7-F. Less Waste, Higher Strength in Precision-Tapered Tube Parts. Graham B. Brown. *Aviation Age*, v. 18, Dec. 1952, p. 48-51.
Machine in which steel tubes are drawn through a die and over a mandrel to form aircraft parts. Photographs. (F26, ST)

8-F. Extruding Giants Coming Along. Irving Stone. *Aviation Week*, v. 57, Dec. 1, 1952, p. 42, 47-48.
Trends in large extrusion presses. Both nonferrous and ferrous metals are to be used but the latter to less extent. Photograph and diagrams. (F24)

9-F. Continuous Heating, Press Forging and Heat Treating of Automobile Crankshafts. *Industrial Heating*, v. 19, Nov. 1952, p. 2042-2046, 2048, 2050, 2052, 2054, 2056, 2058, 2184.
Production of high-quality automobile crankshaft by a continuous press-forging process at new Crankshaft Press Shop of the Chrysler Corp.'s Dodge Forge Plant. (F22, J general, ST)

10-F. Automation Cuts Forging Costs, Improves Quality. E. G. de Coriolis and J. D. Nesbitt. *Iron Age*, v. 170, Nov. 27, 1952, p. 106-109.
How faster forging machines, high-speed heating furnaces, and modern transfer equipment have made automation in the forge shop practical. Diagrams and photographs. (F22)

11-F. Speed-Dependent Variables in Cold Strip Rolling. R. B. Sims and D. F. Arthur. *Journal of the Iron and Steel Institute*, v. 172, Nov. 1952, p. 285-295.
Various ways in which mill speed may influence specific roll load and strip thickness in cold rolling. Steel and copper strip were used with thicknesses on entry between 0.050 in. and 0.010 in., and a range of mill speeds between 10 and 300 ft. per min. Results show that variation of the coefficient of friction between rolls and strip is principal cause of load and thickness changes. Methods of automatic control suggested by Hessenberg and Sims will maintain gage to close tolerances over the speed range of the experimental mill. Tables and charts. 16 ref. (F23, Fe, Cu)

12-F. Aluminium Extrusion Billet Heating. *Metal Industry*, v. 81, Nov. 21, 1952, p. 407-408.
Magnethermic induction furnace, including automatic controls. (F21, Al)

13-F. Modern Brass Mill Turns Out Quality Products in Quantity. Arthur H. Allen. *Metal Progress*, v. 62, Nov. 1952, p. 110-112.
Description of Chase Brass & Copper Co. plants in Euclid, O., including melting, rolling, extrusion, welding, and annealing and pickling machines. (F23, C21, Cu)

14-F. Heavy Presses Challenge Industry. Alexander Zietlin. *Steel*, v. 131, Dec. 1, 1952, p. 76-79.
Introduction of new heavy hydraulic presses to American industry to fabricate a variety of structural members from ferrous and nonferrous metals—such as carbon and stainless steels, aluminum and copper, and their alloys. (F22, CN, SS, Al, Cu)

15-F. "Watch Charm" Mill Specializes on Small Diameter Buttweld Pipe. John D. Knox. *Steel*, v. 131, Dec. 1, 1952, p. 90, 93-95, 98-101.
Continuous buttweld mill built by the Sharon Tube Co., Sharon, Pa. (F26, ST)

16-F. Custom Mill Tackles Production Headaches. S. W. Baker. *Steel*, v. 131, Dec. 8, 1952, p. 94-97.
Special equipment and techniques used by American Silver Co., Flushing, N. Y., to roll small lot and special orders of almost any metal in thin strip form. (F23)

17-F. "Impacting"—A Revolutionary New Forging Process. Harold C. Hood. *Steel Processing*, v. 38, Nov. 1952, p. 553-555, 569.
New method for forming of materials recently developed by Chambersburg Engineering Co. Photographs and diagrams. (F22)

18-F. Die Sinking by Drop Forging. Part III. Forging Process. Adolph Rohrmann. *Steel Processing*, v. 38, Nov. 1952, p. 561-568, 578.
Methods and advantages. Photographs, diagrams, and charts. (F22, TS)

19-F. Forged Skin-Panels. Part 4. Third Phase Tests: Electronically-Heated Die: Die Finishing and Lubrication: Final Results. *Aircraft Production*, v. 14, Dec. 1952, p. 412-415.
The final stages of skin-panel forging. Die construction, lubrication, and results of test runs. Photographs and diagrams. (F22, Al, Mg)

20-F. Techniques and Problems in Large Extrusion Production. T. F. McCormick. *Iron Age*, v. 170, Dec. 11, 1952, p. 158-161.
Large extrusion press being installed at Alcoa's Lafayette, Ind., works. Production of solid extruded shapes 90 ft. long, 23 in. max. diameter and 2300 lb. in weight is being planned. Auxiliary equipment such as heat treating, preheating and reheating furnaces and straightening machines. (F24, Al)

21-F. Titanium Forging Experience Mounts. R. J. Bullock. *Steel*, v. 131, Dec. 15, 1952, p. 104-107.
Peculiarities of Ti in the forging process. Examples of successful forgings produced by Wyman Gordon Co., Worcester, Mass. (F22, Ti)

22-F. (French.) **Different Stages in the Manufacture of Rolled Rail.** M. Stammbach. *Circulaire d'Informations Techniques*, v. 9, no. 11, 1952, p. 1583-1596.
Processing of ingot to finished product, including comparisons between French and U. S. methods, main difference being that French use basic bessemer, and U. S. openhearth steel. Diagrams, tables. (F23, T23, ST)

G

SECONDARY MECHANICAL WORKING

1-G. Grinding Fixture Aids Die Manufacture. Rupert LeGrand. *American Machinist*, v. 96, Nov. 24, 1952, p. 134-135.
Steps in making dies for magazine tube forming. Photographs and diagrams. (G18, AY)

2-G. Curtiss-Wright Boosts Output With Machinability Data. Rupert Legrand. *American Machinist*, v. 96, Nov. 24, 1952, p. 141-148.
Reorganization at above plant to reduce costs and labor. Tabulates reduction in cutting times with carbide tooling. Diagrams and photographs illustrate equipment. Applications cited relate to forged cylinder barrel and crankcase sections—both hardened and tempered steel—for compound piston engines. (G17, C-n, ST)

3-G. What's Ahead the Next Ten Years in Tools and Tooling. *American Machinist*, v. 96, Mid-Nov. 1952, p. C-C15.
Carbide cutting tools, abrasives, jigs and fixtures, portable tools, setup accessories, small tools, automation, and press-shop automation. (G general, T6)

4-G. Six-Year Bibliography of Press-Working Articles in American Machinist. *American Machinist*, v. 96, Mid-Nov. 1952, p. D50, D52, D54.
Covers 1947-1952. (G1)

5-G. Stretch-Forming in a Hurry. David Morse. *Aviation Age*, v. 18, Dec. 1952, p. 38-42.
Machine which can stretch Al at less cost and more rapidly. Photographs and diagrams. (G9, Al)

6-G. Determination of the Quality of a Turned Surface From the Weight of Metal Removed During Turning. W. Leyensetter. *Engineers' Digest*, v. 13, Nov. 1952, p. 395-396.
Previously abstracted from original in *Zeitschrift des Vereines Deutscher Ingenieure*, item 508-G, 1952. (G17)

7-G. Fabricating and Painting Steel Partitions. Walter Rudolph. *Finish*, v. 9, Dec. 1952, p. 25-28.
Types of materials used for sound deadening, the cleaning process, roll-forming equipment, spot welding, painting doors, and special skids for doors. (G11, L12, L26, K3, CN)

8-G. Automatic Bar Pointer Improves Spring Production. W. G. Patton. *Iron Age*, v. 170, Nov. 27, 1952, p. 120-122.
Addition of a comparatively simple mechanical bar-handling and roll-feeding device has increased production and cut rejects of pointed steel bars used for front suspension coil springs in Chrysler-made cars. (G27, ST)

9-G. Manufacture of Aluminium-Sheathed Cable. *Light Metals*, v. 15, Nov. 1952, p. 357-360.
Advantages and production of Al-sheathed cable. Diagrams and illustrations. (G general, T1, Al)

10-G. High Strength Aluminum Impact Extrusions. M. P. Meinel. *Materials & Methods*, v. 36, Nov. 1952, p. 110-113.
Recent improvements in techniques of impact extruding which show that high-strength Al alloys can be worked by this method into a variety of shapes. Illustrations and diagrams. (G5, Al)

11-G. Bending of Aluminum Alloy Sheet. *Materials and Methods*, v. 36, Nov. 1952, p. 143.
Data sheet gives minimum allowable radii for bending Al alloy sheet depending on thickness, temper, and composition of material. (G6, Al)

12-G. "Hydro-Sizing" Proves Economical. Everett Jackman. *Modern Machine Shop*, v. 25, Dec. 1952, p. 170, 172, 174, 176.
Large aircraft manufacturer effectively utilizes above technique to finish-form externally-carried Al fuel tanks. (G8, Al)

13-G. A Leading Fabricator Enters the Magnesium Sheet Business. I. A. Campbell. *Modern Metals*, v. 8, Nov. 1952, p. 30-32, 34, 36-37.
Growth of Brooks & Perkins, Inc., Detroit, and its processes for forming Mg sheet. (G general, Mg)

14-G. Interview With Magnethermic's Logan. *Modern Metals*, v. 8, Nov. 1952, p. 54, 56-57.
J. A. Logan's observations on the Al fabricating business in Europe. (G general, Al)

15-G. Centerless Belt Grinds Extruded Stock. *Steel*, v. 131, Dec. 8, 1952, p. 102.

Method for fast grinding and rough finishing of bar and tube stock developed by Production Machine Co., Greenfield, Mass., and Behr-Manning Corp., Troy, N. Y., for removing die marks from high-alloy and stainless steel extrusions. (G18, SS, AY)

16-G. Cold Heading as a Method of Fabrication. Part I. Lester F. Spencer. *Steel Processing,* v. 38, Nov. 1952, p. 556-560, 569.

Advantages of using cold heading for production of articles from various ferrous and nonferrous metals. 11 ref. (G10)

17-G. New Atomic Secrets Will Be Revealed. *Welding Engineer,* v. 37, Dec. 1952, p. 48-49, 64.

Flame cutting, deburring, welding, and stress-relieving of steel magnet components of the "Cosmotron". (G22, K general, J1, CN)

18-G. Plant Employs Know-How for Custom-Built Trucks on Atom Gun Transport. Howard E. Jackson. *Western Metals,* v. 10, Nov. 1952, p. 31-34.

Forming, welding, and finishing processes used by Kenworth Motor Truck Corp., Seattle, Wash., for the atom gun transport.
(G general, K general, L general)

19-G. Salvage Cut 60% Using Hot-Rolled "T" Sections. Frank Charity. *Western Metals,* v. 10, Nov. 1952, p. 38-39.

Savings realized by using rolled shapes instead of bar stock at the J. C. Peacock Machine Co., Los Angeles, for fabrication of an aircraft "flap track." (G general, ST)

20-G. Abrasive Grinding Method Tapers Aircraft Skins. Paul J. Queyrel. *Western Metals,* v. 10, Nov. 1952, p. 49-51.

Method developed at Aircraft Industries Assn., Huntington Park, Calif. (G18, Al)

21-G. Appreciable Deformation of Work Piece Discovered in Research on the Orthogonal Cutting of Metal. E. G. Thomsen, J. T. Lapsely Jr., and R. C. Grassi. *Western Metals,* v. 10, Nov. 1952, p. 54-55.

Evidence is presented that deformation of workpiece in orthogonal cutting of metals is appreciable and may constitute major part of energy absorbed in metal cutting when depth of cut becomes small. Diagrams, charts, and micrographs give information obtained with SAE 1113 steel. (G17, CN)

22-G. (Russian.) **Influence of Surface Films on the Appearance of Seizing of Aluminum.** A. P. Semenov. *Doklady Akademii Nauk SSSR,* v. 86, Sept. 11, 1952, p. 357-359.

The effects of oxide layers and lubricants on Al sheet during deep drawing operations were studied. The optimum oxidizing time and temperature were determined. Oleic acid was found to be the best lubricant. (G21, Al)

23-G. Tube Manipulation. Part II. Bending and Butting. *Aircraft Production,* v. 14, Dec. 1952, p. 398-403.

Equipment and techniques for bending and butting tubes. (G6)

24-G. Low-Cost Methods Speed Die Construction. W. Curtis Miller. *American Machinist,* v. 96, Dec. 8, 1952, p. 93-96.

Production of large experimental dies using Zn alloys and expanding plastic patterns at Richard Bros. Div. of Allied Products Corp., Hillsdale, Mich. (G1, Zn)

25-G. Wet Belt Grinding Speeds Production of Extruded Cylindrical Stock. Dirck Olton and Hugh N. Dyer. *American Machinist,* v. 96, Dec. 8, 1952, p. 106-107.

Previously abstracted from *Steel;* see item 15-G, 1953. (G18, SS, AY)

26-G. Latest Improvements in Press Automation at Ford. Miles J. Rowan. *American Machinist,* v. 96, Dec. 8, 1952, p. 109-118.

Special designs of presses, dies, welders, blank loaders, and other equipment to permit maximum benefits of automation in Ford's new Buffalo plant. (G1)

27-G. Stainless Steel Aircraft Nacelles. J. A. Logan. *Automotive Industries,* v. 107, Dec. 1, 1952, p. 49, 108.

Design and methods of construction, particularly the stretch-forming and welding operations.
(G9, K general, SS)

28-G. Metal Cutting Developments. R. J. S. Pigott. *Lubrication Engineering,* v. 8, Dec. 1952, p. 289-290, 308, 310.

New method of using cutting fluids to cut metals. Comparison with previous procedures. (G17)

29-G. New Grinding and Machining Processes Promise Conservation of Diamonds. M. Bryan Baker. *Machine and Tool Blue Book,* v. 48, Dec. 1952, p. 219, 221-227.

"Electro-erosive", electro-sparking, electro-arcing, ultrasonic, and combined processes. (G17, G18)

30-G. Having Trouble With "430" Stainless? Richard E. Paret. *Machinery,* v. 59, Dec. 1952, p. 182-188.

Compares both of the grades and reviews changes in technique that are essential to successful conversion from 18-8 type stainless steels to straight Cr types including deep drawing, machining, and welding. Some mechanical properties are tabulated. (G4, G17, K general, Q general, SS)

31-G. How Jet-Engine Combustion Chambers Are Fabricated. Lawrence A. Prchal. *Machinery,* v. 59, Dec. 1952, p. 189-191.

Operations at Ryan Aeronautical Co., San Diego, including forming and welding of Inconel and stainless steel components.
(G general, K general, Ni, SS)

32-G. Corrugated Aluminium-Sheathed Cable. *Metallurgia,* v. 46, Nov. 1952, p. 237-240.

Process used by Pirelli-General Cable Works, Ltd., in which an oversize Al tube is welded around the cable and then corrugated so that its internal diameter is reduced to that of the cable. Mechanical properties are briefly discussed.
(G general, Q general, Al)

33-G. Contour Developer for Sheet Metal Products. Lew W. Goodwin. *Tool Engineer,* v. 29, Dec. 1952, p. 48-51.

Novel method of producing 3-dimensional plaster shapes for mock-ups, foundry patterns, and master tooling for contoured sheet products. Accuracy is insured by the simple and direct transfer of dimensions from loft to model. (G1, E17)

34-G. How to Increase Press Brake Efficiency. Harry M. Smithgall. *Tool Engineer,* v. 29, Dec. 1952, p. 57-59.

Procedures and precautions. (G1)

35-G. Tooling for Toys. G. F. Schumacher. *Tool Engineer,* v. 29, Dec. 1952, p. 63-69.

Tooling at the A. C. Gilbert Co., New Haven, Conn. for producing toys. Die casting, powder metallurgy, vacuum metalizing, automatic assembly and testing.
(G general, E13, H general, L23)

36-G. Metallurgical Aspects of Machinability of Steel. W. I. Pumphrey. *Welder,* v. 21, July-Sept. 1952, p. 63-68.

Provides welding engineers with concise and up-to-date information which affects many factors, including cost and productivity. (To be continued.) (G17, ST)

NATIONAL METAL CONGRESS
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H

POWDER METALLURGY

1-H. Planning an Economically Sound In-Plant Powder Metal Production Setup. Lawrence H. Johnson. *Modern Industrial Press,* v. 14, Nov. 1952, p. 24, 26, 28.

Various advantages of powder metallurgy over other competing methods of fabrication. (H general)

2-H. Austria Is Host to World Congress on Powder Metallurgy. Henry H. Hausner. *Metal Progress,* v. 62, Nov. 1952, p. 79-83.

Brief summaries of following papers presented June 22-26, 1952, at Reutte (Tyrol), Austria: "Properties of Hard Metal Alloys", C. Ballhausen; "High-Temperature Materials by Silicizing Tungsten and Molybdenum", E. Fitzer; "Preparation of Purest Titanium Carbide", G. F. Huettig; "Formation of Solid Solutions of Hard Metals", R. Kieffer; "Investigations on Ternary Systems Me_1-Me_2-B and a Discussion of the Relative Strength of the Bond Transition Metal, Boron", R. Kiessling; "Ternary System Tungsten-Carbon-Cobalt", John T. Norton; "Development of High-Strength Heat Treatable Products From Alloy Powders", G. J. Comstock and F. H. Clark; "Developments in the Powder Metallurgy of Aluminum", A. von Zeerleder; "Effect of Lattice Changes on the Sintering Process", H. H. Hausner; "Some Observations on the Mechanism of Liquid Phase Sintering", F. V. Lenel; "Microhardness Test as an Auxiliary in Examining Sinter Changes in Complex Systems", E. M. Onitsch-Modl; "Contributions to the Physical Analysis of the Sintering Process", G. Ritzau; and "New Concepts of Diffusion in Metals", W. Seith.
(H general)

3-H. Determination of the Pore-Size Distribution in Porous Metal Bodies. P. R. Marshall. *Nature,* v. 170, Nov. 1, 1952, p. 761.

Brief theoretical analysis. Procedure is mentioned. (H11)

4-H. The Sintering of Powders and Diffusion. R. S. Barnes. *Philosophical Magazine,* ser. 7, v. 43, Nov. 1952, p. 1221-1224.

Applies result of recent interdiffusion experiments using solid sandwiches of metals which form a complete series of solid solutions, to the density behavior of mixed powders which also form solid solutions, and to the fundamental problem of the mechanism of the sintering process. Cu-Ni, brass-Cu, and Al-bronze plus Cu sandwiches were used in experiments. (H15, N1, Cu, Ni, Al)

J

HEAT TREATMENT

1-J. Automatic Heat-Treating Speeds Gear and Pinion Production. Herbert Chase. *Iron Age,* v. 170, Nov. 20, 1952, p. 128-130.

Installation of new heating and quenching equipment which virtually eliminates the need for slow and expensive pinion straightening operations. Except for loading and unloading, the new setup is fully automatic. Handling was reduced

considerably, production increased sharply, and quality improved. (J26, ST)

2-J. Fast Gas Furnace Anneals at Normalizing Temperatures. C. A. Turner, Jr. and S. L. Yarborough. *Iron Age,* v. 170, Nov. 20, 1952, p. 140-142, 144.

Shortened annealing time achieved by above furnace for mortar shells. (J23, CN)

3-J. Heating Steel in a Specialty Mill. Laurance F. Van Mater. *Iron and Steel Engineer,* v. 29, Nov. 1952, p. 74-76; disc., p. 76.

General heating procedures in a specialty mill of relatively small tonnage and rather widely diversified products, including items made of high and low-expansion alloys, permanent magnet steels, corrosion- and heat-resistant alloys, valve steels, high-C, high-Cr and high speed steels, and special purpose toolsteels grouped according to type of heating involved in chronological order through various stages of hot working and including subsequent heat treatment. (J general, F1, CN, TS, SG-h, g, n, s)

4-J. What's Ahead the Next Ten Years in Heat-Treating. *American Machinist,* v. 96, Mid-Nov. 1952, p. G-G3.

Carbon restoration, atmosphere generators, furnaces as machines, metallurgical control, furnace fixtures, salt-bath operations, flame hardening, and induction heating. (J general)

5-J. Gas Heat Becomes Precision Tool in End-Hardening Rails. *Industrial Gas,* v. 31, Nov. 1952, p. 8-9.

Use of radiant burners for end-hardening rails. (J26, CN)

6-J. Induction Hardening of Gear Teeth. *Machinery* (London) v. 81, Nov. 14, 1952, p. 1038-1040.

Developments in high-frequency induction heating which offer new and attractive possibilities for gear heat treatment including cost savings and higher production rates. (J2, ST)

7-J. Induction Hardening Boron Steel Gears. George Van Camp. *Materials & Methods,* v. 36, Nov. 1952, p. 121-122.

Changing from a low-alloy to a plain-carbon boron steel and from a two-piece assembly to a solid forging also required changes in hardening technique to assure high surface hardness over a tough core. (J2, AY)

8-J. Gas-Liquid Carburizing. Victor Kappel. *Metal Progress,* v. 62, Nov. 1952, p. 108.

Results of carburizing under positive gas pressure to prevent "subsurface" oxidation and slight scaling during cooling. (J28, ST)

9-J. Automatic Heat Treating Line With Duplex Quench—Either Oil or Water. Fred C. Schaefer and Richard L. Burdsall. *Metal Progress,* v. 62, Nov. 1952, p. 113-116.

Batch loader, continuous heat treating machine, automatic quench tanks, and washing machine installed at Port Chester plant of Russell, Burdsall & Ward Bolt and Nut Co. which makes a large variety of steel screws, bolts and fasteners. Emphasizes ability of equipment to change promptly from oil quenching and washing one type of bolt to water quenching another type, and its economy in comparison with batch treatment in salt pots. (J26, ST)

10-J. Heat-Treatment Oils. Uses in the Metallurgical Industry. A. L. H. Perry. *Metal Treatment and Drop Forging,* v. 19, Nov. 1952, p. 467-473, 482.

Types of oils used in heat treating, their origin, application, mode of action, and testing. Tables and photographs. (J2)

11-J. Compressed Air As Cooling Medium in Patenting Steel Wire. Part 2. B. M. Pearson. *Wire Industry,* v. 19, Nov. 1952, p. 1027-1028. (Based on article by W. Puengel, *Stahl und Eisen,* v. 69, no. 8, p. 262-265.)

Some interesting new techniques in steel-wire patenting, employing compressed air as cooling medium. Results of mechanical tests are tabulated and charted. (J25, Q general, ST)

12-J. (Swedish.) **Reaction Equilibria in Protective Gas Annealing. I. Development of Protective Gas Annealing and Importance of Gas Equilibrium to Properties of Protective Gases.** Torkel Berglund. **II. Computation of Gas Reaction Equilibriums in Protective Gas Reactions.** Torkel Berglund, Stig-Erik Erikson, Bertil Lindeskog, and Rolf Marstrander. *Jernkontorets Annaler,* v. 136, no. 8, 1952, p. 253-313; disc., p. 313-316.

Importance of above in annealing of ferrous metals and various types of gas mixtures. Diagrams are given for all reactions. Tables and charts. 25 ref. (J23, Fe)

13-J. Flame-Hardening for the Small Shop. *Linde Tips and Oxy-Acetylene Tips,* v. 32, Jan. 1953, p. 11.

A handy flame-hardening outfit for small shops. (J2, ST)

14-J. Induction Heating Speeds Up Production of Bolt Manufacturing. Howard E. Jackson. *Machine and Tool Blue Book,* v. 48, Dec. 1952, p. 147-153.

How induction heating has increased production and quality for the Northwest Bolt and Nut Co., Seattle, Wash. (J2, G10, ST)

15-J. Die Quenching Aluminum Alloys. John Starr. *Machine and Tool Blue Book,* v. 48, Dec. 1952, p. 201-204, 206.

Special equipment and process developed by North American Aviation, Inc., Los Angeles, for heat treating a single-component wing structure previously assembled from 226 pieces of 75S-T Al alloy. (J26, Al)

16-J. An Investigation of the Effect of Heat Treatment Upon the Hardness, Microstructure and Combined Carbon Content of Some Nodular Cast Irons. James H. Barnett. *Quarterly of the Colorado School of Mines,* v. 47, Jan. 1952, p. 45-87.

Investigation to determine effect of soaking time and quenching temperature on microstructure, combined carbon content and hardness of several nodular cast irons, and to determine whether nodular cast irons produced by different nodulizing compounds behave in the same manner upon being quenched from the same temperatures. Tables, graphs, and micrographs. 13 ref. (J26, M27, Q29, CI)

17-J. Flame Hardening of Bed Ways Having Nonuniform Sections. *Tool Engineer,* v. 29, Dec. 1952, p. 47.

Machine developed by the Monarch Machine Tool Co. (J2, T5, ST)

K

JOINING

1-K. Ingenious Machines Weld Thin-Wall Stainless Tanks. Robert L. Brown. *American Machinist,* v. 96, Nov. 24, 1952, p. 125-128.

Procedures for welding oxidizer tanks from Type 410 stainless steel. Overlapping spot welds replace regular seam welds for pressure-tight joints. Diagrams and photographs of equipment. (K3, SS)

2-K. Flame-Fluxing Brazes High-Strength Assemblies. John Shinn. *American Machinist,* v. 96, Nov. 24, 1952, p. 132-133.

Use of brass rod and flux applied by flame to replace scarce silver solder at McCulloch Motors Corp., Los Angeles. Applied to joining of steel tubing for handlebars. Photographs. (K8, Cu, SG-f, ST)

3-K. Induction Brazing Can be Used for Copper and Copper-Alloy Parts. E. M. Laughner. *American Machinist,* v. 96, Nov. 24, 1952, p. 138-140.

Examples and conditions governing application of induction heating for assembly of Cu parts. (K8, Cu)

4-K. Prefabricated Steel Vessels for Inland Waters. T. A. McLaren. *Engineering Journal,* v. 35, Nov. 1952, p. 1180-1184.

How welding has made possible substantial savings in shipment and on-site assembly costs. Diagrams. (K general, T22, CN)

5-K. Spot Welding in the Construction of the "Comet". C. A. Burton. *Welding and Metal Fabrication,* v. 20, Nov. 1952, p. 384-388.

Procedure adopted in material preparation (material precleaning operation, use of paste-etch cleaning, and subassembly of components prior to spot welding), welding, and subsequent inspection under laboratory control. High-strength Al alloys are used. (K3, L12, Al)

6-K. Maintenance of Civil Engineering Plant. *Welding and Metal Fabrication,* v. 20, Nov. 1952, p. 389-392.

The central depot of John Laing & Son, Ltd., Elstree, England, for repair and maintenance of company's civil-engineering equipment which involves a considerable amount of welded fabrication. Photographs show machinery and examples of work done. (K general, T4, CN)

7-K. Argonarc Welding Aluminium Brewery Plant. F. J. Stiles and J. F. Lancaster. *Welding and Metal Fabrication,* v. 20, Nov. 1952, p. 393-395.

Fabrication of brewery fermenting vessels from pure Al. Size and construction prevented oxyacetylene welding. Advantages and disadvantages of using argon-arc welding. (K1, Al)

8-K. Combined Welding and Forming Lower Appliance Costs. John Maloney. *Steel,* v. 131, Nov. 24, 1952, p. 104, 106.

A machine that performs both operations, requiring only one operator and affording savings in floor-area requirements. It is used in production of a variety of appliance cabinets and liners. (K3, G6, ST)

9-K. What's Ahead the Next Ten Years in Joining and Assembly. *American Machinist,* v. 96, Mid-Nov. 1952, p. F-F9.

Staking and doweling; gas, arc, inert-gas-shielded, resistance, pressure, and cold welding; soft soldering; and Cu and Ag brazing. Bolts and screws, adhesives, and assembling machines and conveyors. (K general)

10-K. Continuous Inert Arc Welding. *Canadian Metals,* v. 15, Nov. 1952, p. 45-46.

Inert-arc welding and its applications, including a semi-automatic process allowing continuous production of fine gage welds. (K1)

11-K. Welding in the Electrical Industry. J. Heuschkel. *Electrical Engineering,* v. 71, Dec. 1952, p. 1095-1100.

Welding in terms of its historical perspective, various processes, various ferrous and nonferrous materials, research, educational aspects, and future prospects. (K general)

12-K. Investigation of Thermal Processes in Spot Welding by Means of Models. D. S. Balkovetz. *Engineers' Digest,* v. 13, Nov. 1952, p. 374-376.

Previously abstracted from original in *Avtogennoe Delo,* see item 491-K, 1952. (K3, ST, Al)

13-K. Welding in the Soviet Union. J. Mannin. *Engineers' Digest,* v. 13, Oct. 1952, p. 351-356; Nov. 1952, p. 387-392.

Compares present techniques with those used in U. S. Includes survey of automatic arc welding under granulated flux. Diagrams and tables. (K general)

14-K. Ferrous Rod for Welding Nodular-Graphite Cast Iron. R. V. Riley and J. Dodd. *Foundry Trade Journal,* v. 93, Nov. 13, 1952, p. 555-560.

Experimental welds were made by oxyacetylene and electric arc to determine welding properties of nodular-graphite cast iron. Electric arc welding caused formation of hard carbide flash at base metal-weld metal junction. Gas welding with proprietary cast iron welding rods yielded a weld of low physical properties due to presence of flake graphite. A new welding rod was developed for gas welding which yielded a nodular-graphite cast iron weld deposit. (K1, K2, CI)

15-K. Joining Copper Tube and Soldered Fittings. Doremus L. Mills. *Heating and Ventilating,* v. 49, Dec. 1952, p. 105-106.

Procedure for proper making of soft soldered joints between Cu tube and fittings that are strong enough to withstand stresses that might occur in most domestic piping systems. Illustrations demonstrate seven steps employed in this method. (K7, Cu)

16-K. Welded Industrial Structures for Economy and Efficiency. Van Rensselaer P. Saxe, *Industry & Welding,* v. 25, Dec. 1952, p. 39-42.

Advantages and savings possible by using welding in building construction. Photographs and diagrams. (K general, T26, ST)

17-K. Importance of the Root Pass in Pipe Welding. M. W. Eddins. *Industry & Welding,* v. 25, Dec. 1952, p. 44-46, 47, 74-75.

Methods of producing good welds in steel pipe. Diagrams and photographs. (K general, ST)

18-K. Submerged Arc Welding Builds 1,000 Steel Shells. Donald F. Baumler. *Industry & Welding,* v. 25, Dec. 1952, p. 50-52, 83.

Quality production welding of 1,000 steel shells at Farrar & Trefts, Inc., Buffalo, N. Y., using automatic submerged-arc welding, coupled with company-developed welding techniques and rigid quality control. (K1, ST)

19-K. Low-Hydrogen Electrodes Used in Welding 1½"-5½" Plate. W. D. Warren. *Industry & Welding,* v. 25, Dec. 1952, p. 54, 87.

Techniques used in construction of large press frames at the Dominion Bridge Co., Ltd. (K1, ST)

20-K. Here's How to Weld 17% Chromium Stainless Steel. *Industry & Welding,* v. 25, Dec. 1952, p. 58-60, 62, 98-99.

Techniques and properties of welds made by different methods. Tables and photographs. (K general, SS)

21-K. Proper Procedure Eases Welding of Stainless Clad Steels. Part II. (Concluded) *Industry & Welding,* v. 25, Dec. 1952, p. 77-78, 80, 82.

Techniques for welding various gage sheets and plates; also for annealing and cleaning. (K general, J23, L12, SS)

22-K. Here's How Improved Brazing Methods Make Leak-Proof Refrigeration Units. A. L. Johnson. *Industry & Welding,* v. 25, Dec. 1952, p. 84, 86-87.

Techniques and new developments. Various combinations of metals are included. (K8, Cu, ST)

23-K. Oxy-Acetylene Welding of High Carbon Steel. *Industry & Welding,* v. 25, Dec. 1952, p. 120-121.

Ten points for insuring good welds of band saw blades. (K2, CN)

24-K. Making High Tensile Short-Link Steel Chain. W. Gibson Biggart. *Machinery* (London), v. 81, Nov. 14, 1952, p. 1034-1037.

Chain fabrication, including resistance buttwelding and flash buttwelding machines. Mechanical tests for chains. (K3, Q general, AY)

25-K. How to Fabricate 17 Percent Chromium Stainless Steel. Richard E. Paret. *Materials & Methods,* v. 36, Nov. 1952, p. 100-104.

Welding of Type 430 stainless steel. Weld ductility can be improved by reducing heat input during welding, by using 430-T, by annealing the welds, and by using a Cr-Ni welding electrode. Tables and illustrations. (K1, SS)

26-K. Welded and Brazed Parts. H. R. Clauser. *Materials & Methods,* v. 36, Nov. 1952, p. 123-138.

Manual on shapes, sizes, thicknesses that can be welded, weldable materials, properties and characteristics of welded joints, joint designs and welds, cost considerations, and typical applications. (K general)

27-K. The Assembly of Aluminium Components by Welding. H. W. Keeble. *Metal Industry,* v. 81, Nov. 21, 1952, p. 401-403.

Features of unit assemblies involving fusion welding of sand cast and wrought Al alloys. Typical applications. (K general, Al)

28-K. Some Interesting Aluminium Alloy Castings. H. C. Cross. *Metal Industry,* v. 81, Nov. 21, 1952, p. 403.

Replacement of an iron casting by a gravity die-cast Al frame cast in two pieces and joined by arc welding. (K1, E13, Al)

29-K. The Story of Platte Pipe Line: Details of Design and Construction. Melvin M. Lee. *Oil and Gas Journal,* v. 51, Dec. 1, 1952, p. 109, 111.

Process of laying a 20-in. pipe line and problems encountered. Welding by electric shielded arc, X-ray inspection, coatings applied to pipe, cathodic protection, and testing to determine leaks in pipes. (K1, S13, L26, R10, CN)

30-K. Automatic Welding of Tool Joints Made Practical. *Oil and Gas Journal,* v. 51, Dec. 8, 1952, p. 110-111.

Welding procedure and equipment which eliminate porosity due to gases generated from "dope", and undercutting and cracking due to high welding currents. (K1)

31-K. Welding Repairs to a Large Casting for a Swing Dock Bridge. J. T. Williams. *Welder,* v. 21, July-Sept. 1952, p. 50-52.

The building up of a large hydraulic ram made of cast iron using "Cinex" Ni electrodes. Photographs. (K1, T26, CI, Ni)

32-K. A New Factory of the Portal Frame Type. S. J. Seabrook. *Welder,* v. 21, July-Sept. 1952, p. 53-56.

Welding procedures and fixtures used in construction of steel frame for factory. (K1, T26, ST)

33-K. Two Welded Labour-Saving Agricultural Machines. *Welder,* v. 21, July-Sept. 1952, p. 57-58.

Welding of steel parts was used extensively. Techniques. (K1, T3, ST)

34-K. A Small Welded Steel Frame Factory Building. D. D. Bamber. *Welder,* v. 21, July-Sept. 1952, p. 61-62.

Welding of steel trusses. (K1, T26, ST)

35-K. Saved: 341 Tons of Steel. II. R. A. Phelps. *Welding Engineer,* v. 37, Nov. 1952, p. 32-35; Dec. 1952, p. 56-59.

Erection procedure, including field welding, used for the V. A. Hospital building in Minneapolis. Tables, diagrams, and photographs. (K general, T26, CN)

36-K. Welding Is Crude on Russian Tanks. H. C. Phelps. *Welding Engineer,* v. 37, Dec. 1952, p. 50-51, 64.

Raises questions of overdesign in U. S. equipment. (K general)

37-K. Sparks Fly as Armored Bus Hulls Take Shape. *Welding Engineer,* v. 37, Dec. 1952, p. 52-53, 62.

How our military vehicles are joined at Consolidated Western Steel plant. (K1, ST)

38-K. How Would You Repair This Yankee Drier Roll? F. C. Zimmer. *Welding Engineer,* v. 37, Dec. 1952, p. 54-55.

Repair of a large cast-iron pulp drier with Mn-bronze filler rods. (K2, CI)

39-K. Seam Welding at 120,000 Amperes. *Welding Engineer,* v. 37, Dec. 1952, p. 60-62.

Mammoth welders at Ryan Aeronautical Co. make leakproof seams on the world's biggest Al fuel tanks for aircraft. (K3, Al)

40-K. Automatic Single and Multiple Hydraulic Riveting. Andrew E. Rylander. *Western Machinery and Steel World,* v. 43, Nov. 1952, p. 94-96.

How hydraulic riveters can be applied to full and semi-automatic riveting, using standard power units. Automatic cycling and details of operation. Diagrams. (K13, CN)

41-K. Alloy Eliminates Flux in Welding Aluminum. Samuel Freedman. *Western Metals,* v. 10, Nov. 1952, p. 44-46.

Chemalloy, which permits welding or soldering of Al without flux or special preparations. (K general, Al)

42-K. (French.) **The Process of Assembling Small Metallic Structures of Light Alloys.** René Léveillé. *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 362-363.

Method used for joining light alloys including welding, riveting, bolts and screws, and pressing. (K general, Al)

43-K. (German.) **A New Variation of Pressure Welding.** Leo Knez. *Schweisstechnik,* v. 6, Sept. 1952, p. 101-106.

Steel surfaces which are to be joined and which have been heated to 1000° C., are treated for a short time with a carburizing acetylene flame. Details of the process are diagramed. Micrographs, photographs. 15 ref. (K2, ST)

44-K. Novel Methods Arc Weld High-Strength Alloys. F. G. Harkins and H. C. Thompson. *American Machinist,* v. 96, Dec. 8, 1952, p. 118-124.

How welding problems on tough, heat resistant alloys have been overcome at Solar Aircraft by specially developed equipment and innovations in welding technique that give high-speed, high-quality welding without need for highly skilled operators. (K1, SS)

45-K. Welding's Fast Growth Beats General Industry Rate by 250%. T. J. Jefferson. *Industrial Marketing,* v. 37, Dec. 1952, p. 34, 36-37, 169-171.

Growth of welding techniques and expected future. (K general)

46-K. Braze-Welding Clinic. *Linde Tips and Oxy-Acetylene Tips,* v. 32, Jan. 1953, p. 8-9.

A series of photographs illustrating typical faulty brazing practices. Remedies. (K8)

47-K. Recommended Conditions for Spot Welding Some Combinations of Dissimilar Metals. *Machinery,* v. 59, Dec. 1952, p. 251.

Data sheet. (K3)

48-K. Ultrasonic Soldering in the Foundry. Light Alloy Casting and Pattern Repairs. *Metallurgia,* v. 46, Nov. 1952, p. 251-252.

Use for repairing faulty light alloy castings and Al patterns. (K7, Al)

49-K. Cutting and Welding Stainless Steel. *Petroleum,* v. 15, Dec. 1952, p. 331-332, 334.

Methods which enable heat, corrosion resistance, and other valuable

properties of this metal to be more widely used. Ways in which welded joints should be finished.
(K general, G22, SS)

50-K. Low-Hydrogen Welding Rods. J. D. Fast. *Philips Technical Review*, v. 14, Sept.-Oct. 1952, p. 96-101.
Basic electrodes designed to suppress the absorption of large quantities of hydrogen which generally results when the O_2 transmission is decreased. 11 ref. (K1)

51-K. Know Your Condenser Tube Joints. A. Levine. *Power Engineering*, v. 56, Dec. 1952, p. 66-67, 107-108, 111.
How to pack and maintain condenser tube joints, and how to remove tubes. Photographs and diagrams. (K general)

52-K. Redesign for Producibility Based on New Welding Technique. *Product Engineering*, v. 23, Dec. 1952, p. 174-180.
Technique for arc welding stainless steel parts to modified nodular cast iron as developed in redesign of center main bearing support for Wright Sapphire turbo-jet engine. Mechanical properties of welds are tabulated. (K1, Q general, CI, SS)

53-K. Stud-Welding Simplifies Rail-Relaying Job on Deck of Concrete Pier. *Railway Engineering and Maintenance*, v. 48, Dec. 1952, p. 1186-1187.
Project involving the reconditioning of pier facilities of Earle U. S. Naval Ammunition Depot at Leonardo, N. J., where it was found necessary to replace all existing railroad salvage on the piers.
(K1, T23, CN)

54-K. Large Casting Repaired by Welding. *Railway Engineering and Maintenance*, v. 48, Dec. 1952, p. 1195.
Arc welding of a broken frame for boiler-plate rolling equipment.
(K1, T23, CI)

55-K. Butt Welding Thin Stainless Steel. *Tool Engineer*, v. 29, Dec. 1952, p. 54.
A condenser discharge technique for spot welding butt joints of very thin stainless steel developed by Naval Ordnance Laboratory.
(K3, SS)

56-K. (German.) **The Importance of Austenitic Fusion Welding in Chemical Engineering.** E. Klosse. *Chemie-Ingenieur-Technik*, v. 24, Nov. 1952, p. 615-617.
Importance and limitations for carbon and stainless steels. Micrographs and charts. (K2, CN, SS)

57-K. (Book.) **Electric Arc and Oxy-Acetylene Welding.** E. A. Atkins and A. G. Walker. 352 pages. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London W.C. 2, England. 30s.
Processes and techniques. Theory of welding, as well as the practical side. Useful background in welding procedures for students includes details of examinations, regulations and specifications, and specimen examination questions of the City and Guilds of London Institute.
(K1, K2)

58-K. (Book.) **The Joining of Metals.** 174 pages. 1952. The Institution of Metallurgists, 4 Grosvenor Gardens, London, S.W. 1. England.
Limited to certain aspects of fusion welding of ferrous and nonferrous alloys, brazing, and soldering. (K general)

59-K. (Book.) **Weldability of Metals.** 141 pages. Lincoln Electric Co., 12818 Coit Rd., Cleveland 17, Ohio. 50 cents in U. S.; 75 cents elsewhere.
Prescribes best welding procedures for various ferrous and nonferrous metals. Tabular data, drawings, and pictures. (K general)

60-K. (Book.) **Welded Highway Bridge Design.** J. G. Clark, editor. 240 pages. 1952. James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. $2.00 in U. S.; $2.50 elsewhere.
Presents major features of designs submitted in award program for all-welded two-lane highway bridges. Covers structural types, floor systems, new sections, connections, quantities, and costs.
(K general, T26, ST)

L
CLEANING, COATING AND FINISHING

1-L. Asphaltic Coatings Can Reduce Corrosion. K. N. Cundall. *Chemical Engineering*, v. 59, Nov. 1952, p. 284, 286.
Use of asphaltic products to prevent corrosion in chemical and chemical processing plants. (L26)

2-L. The Filtration and Pumping of Plating Solutions. G. T. Colegate. *Electroplating and Metal Spraying*, v. 5, Oct. 1952, p. 327-331; Nov. 1952, p. 367-371, 373-374.
General considerations affecting standard of filtration required and choice of filter and accessories. Operation of filter systems, and piping in pumping and filtration processes.
(L17)

3-L. Substitutes for Nickel Plate. *Electroplating and Metal Spraying*, v. 5, Nov. 1952, p. 361-366.
Replies to questionnaire on alternatives to standard Ni-Cr plating are tabulated, covering Cu-Cr, thin Ni between Cu and Cr, red bronze-Cr, Ni between red bronze and Cr, white brass-Cr, bright zinc, Sn-Ni, and other finishes.
(L17, Ni, Cr, Cu, Zn, Sn)

4-L. Wash Primer. *Industrial Finishing*, v. 29, Nov. 1952, p. 26, 28, 30.
Use to provide adhesion between metal-protective paints and a variety of hard-to-finish metals such as stainless steel, Al, Zn, Cd, Sn, Mg alloys, and galvanized iron. Compositions and applications.
(L14, SS, Al, Zn, Cd, Sn, Mg, Fe)

5-L. Preparing and Painting Metal Specialties. Walter Rudolph. *Industrial Finishing*, v. 29, Nov. 1952, p. 48-50, 52, 54.
Facilities at Steel Partitions, Inc., Jamestown, N. Y., for specialty work include spray booths, ovens, and conveyor line; facilities for sanding a variety of surfaces; vapor degreasing; rustproofing; filling, baking, and sanding to make smooth surfaces, and hot-enamel spraying.
(L26)

6-L. Some Factors in Spray-Silvering. P. B. G. Upton, G. W. Soundy, and G. E. Busby. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, p. 103-113. (Preprint)
Process developed for use in electrotyping. A solution of formaldehyde for the reduction of silver ammonio-nitrate solution is used. Tables and graphs. (L23, Ag)

7-L. Developments in Finishing Aluminium Castings. A. P. Fenn. *Metal Industry*, v. 81, Sept. 26, 1952, p. 367-369.
Mechanical finishes, paint finishes, electroplated finishes, anodizing, electro-brightening, vitreous enamel finishes, and hard-surfacing processes. (L general, Al)

8-L. Copper Recovery From Pickling Solutions. *Metal Industry*, v. 81, Nov. 7, 1952, p. 370.
Processes introduced because of shortage of H_2SO_4 and high cost of Cu. (L12, A8, Cu)

9-L. Metal Cleaners. Part II. Milton A. Lesser. *Soap and Sanitary Chemicals*, v. 28, Nov. 1952, p. 46-49, 98.
Requirements and properties. 56 ref. (L12)

10-L. Chromium Plating Pays Off for Steel Mills. *Steel*, v. 131, Nov. 24, 1952, p. 108, 111-112.
Advantages are noticeable decrease in operating costs and maintenance downtime, greater resistance to corrosion, and increase in packing life.
(L17, T5, Cr, ST)

11-L. What's Ahead the Next Ten Years in Finishing. *American Machinist*, v. 96, Mid-Nov. 1952, p. H-H7.
Trend for greater mechanization, organic coatings as rust inhibitors, electroplating, polishing, and chemical treatment. (L general)

12-L. Coating Metals With Aluminum by the Mollerizing Process. Bruce E. Haight. *Automotive Industries*, v. 107, Nov. 1952, p. 39, 96.
A successful method of hot dipping ferrous parts in molten aluminum in use by the American Mollerizing Corp., Beverly Hills, Calif.
(L16, Fe, Al)

13-L. Ceramic Coatings Have Practical Uses. F. R. Nagley. *Bureau of Ships Journal*, v. 1, Dec. 1952, p. 36.
Naval investigation of ceramic coatings for ship parts and accessories with 615 Al alloy and Cr-Ni austenitic steel as base metals.
(L27, Al, SS)

14-L. Vacuum Metallizing of Metals and Plastics. R. W. Brown. *Canadian Chemical Processing*, v. 36, Nov. 1952, p. 38, 40.
Process by which Al in vapor phase is sprayed on metals, plastics, and glass by means of a vacuum apparatus. (L23, Al)

15-L. Laundering Applied to Metals. *Canadian Metals*, v. 15, Nov. 1952, p. 58, 60.
Reclamation of metal parts by cleaning methods used by Metal Laundry Ltd., Toronto. (L12)

16-L. Ultrasonic Tinning Techniques for Aluminum. Alan E. Crawford. *Electronics*, v. 25, Dec. 1952, p. 102-105.
Ultrasonic drivers on soldering irons and solder pots produce cavitation action that removes oxide film from Al, giving simultaneous cleaning and tinning without flux. Oscillator system is self-driven at natural resonant frequency of load through use of pickup coil on magnetostriction driver, eliminating need for tuning. Photographs and diagrams. (L16, Al)

17-L. Water Control Plays Important Role in Finishing of Aluminum. Kenneth E. Walden. *Finish*, v. 9, Dec. 1952, p. 31-32, 63.
Use and advantages of demineralized water for rinsing Al products.
(L12, Al)

18-L. Magnesium Finishes for Aircraft Evaluated. Howard D. Childers. *Iron Age*, v. 170, Dec. 4, 1952, p. 157-161.
Magnesium finishes for production applications were evaluated. The goal of obtaining better protection with less paint was accomplished. Several pigmented vinyl-type primers gave 2-3 times more protection than that of the present system. Diagrams, tables, and photographs. (L26, Mg)

19-L. Silver and Gold Plated Parts Meet Tough Specifications. T. C. Du Mond. *Materials & Methods*, v. 36, Nov. 1952, p. 114-115.
How extremely small parts made from a variety of ferrous and nonferrous materials are being successfully plated. Coatings meet close tolerances and successfully pass rigid tests. (L17, Au, Ag)

20-L. Dip Painting and Spray Coating. M. Reeves. *Metal Industry*, v. 81, Nov. 21, 1952, p. 404-405.
Several methods of applying paint to metal surfaces, with particular emphasis upon spraying technique, ranging from small single spraying units to very large industrial installations. (L26)

21-L. Recent Developments in Protective Coatings. Allen G. Gray. *Metal Progress,* v. 62, Nov. 1952, p. 90-93.

Plating of Al on Fe, various metals on Al and Mg, Sn-Zn alloy plating, and protective siliconizing of Mo. Photographs and tables. (L17, L15)

22-L. Protection of Tubular Structures From the Weather by Metallizing. Alfred Clift. *Metal Progress,* v. 62, Nov. 1952, p. 100-104.

Protection of tubular steel structures against atmospheric corrosion. Particular emphasis is placed on sprayed coatings of Zn or Al. Methods are described. (L23, R3, Zn, Al, ST)

23-L. Here's *Low-Down* On Aluminum Paint. M. C. Davis. *Power,* v. 96, Dec. 1952, p. 123-125.

Steps for applying Al paint include preparing surface, use of surface-preparation chemicals to prevent corrosion, effect of wet surfaces, and application. (L26, T29, Al)

24-L. Flame-Plating . . . A New in Metal Processing. *Western Machinery and Steel World,* v. 43, Nov. 1952, p. 91-93.

Method of applying powder metal—such as tungsten carbide—to hard surfacing of metal parts recently announced by Linde Air Products Co. It permits depositing tungsten carbide in form of a thin coating undiluted by welding rod or base metal. (L24, W, C-n)

25-L. (French.) **The Use of Aluminum Paint for Heat Insulation on French Railroads.** *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 347-349.

Experiments show little difference in heat insulation with glass wool, cork, or Al paint. Applications of the latter in railroad cars. (L26, Al)

26-L. (French.) **Thin Metallic Layers. Their Production and Electrical Properties.** Gaston Ranc. *Vide,* v. 7, July-Sept. 1952, p. 1211-1219.

Experimental methods for evaporation in a vacuum, influence of thickness on electrical resistance of the layer, evolution of layers as a function of time, influence of support, and of temperature. Charts and micrographs. (L25, P15)

27-L. (German.) **Cleaning and Descaling Preparatory to the Enameling of Gray Iron.** G. Gesche. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.,* v. 29, Sept. 1952, p. 325-328.

Methods and equipment. Surface treatment influences the formation of gases during the enameling process. Diagrams, photographs, and graphs. (L27, CI)

28-L. A Study of the Direct Bonding of a Tin-Base Babbitt Metal to Grey Cast Iron. F. T. Smith. *Australasian Engineer,* Oct. 7, 1952, p. 59-65.

Manufacture of centrifugally cast Babbitt bearings with gray cast iron backings. Particular attention is paid to preparation of cast-iron surface, preparatory to tinning. Micrographs and table. (L22, Sn, CI)

29-L. How Protective Coatings Fight Corrosion. Kenneth Tator. *Chemical Engineering,* v. 59, Dec. 1952, p. 143-190.

An exhaustive report on painting programs, organic coatings and their properties, including a list of trade names and manufacturers, and a list of metals and alloys for corrosion resistant structures. Introduction by John R. Callaham. (L general)

30-L. Properties of Steel Enameling. Part I. M. B. Gibbs and F. R. Porter. *Finish,* v. 9, Dec. 1952, p. 21-23, 70, 72.

Chemical analyses and an outline of physical properties and finishing characteristics of mild steel, enameling iron, and special irons and steels such as Ti-bearing steel. (To be continued.) (L27, CN, Fe)

31-L. Changes in the Processes and Products of the Tin Plate Industry: II. Charles A. Ferguson. *Industrial Heating,* v. 19, Nov. 1952, p. 2089-2090, 2093-2094, 2096, 2098, 2100.

Changes in processes of annealing, temper rolling and coating steel with tin. (To be continued.) (L17, J23, F23, CN, Sn)

32-L. Mechanical Cleaning Gives Higher Luster at Lower Cost. W. G. Patton. *Iron Age,* v. 170, Dec. 11, 1952, p. 155-157.

How abrasive scouring has helped boost production of stainless steel with a mirror-like finish at Midland Works of Pittsburgh Crucible Steel Co. (L10, SS)

33-L. Automatic Hard-Facing of Tungsten Carbide. *Machinery,* v. 59, Dec. 1952, p. 196.

Equipment and process including a Heliweld head, control panel, wire positioner, hopper arc welding machine, and He regulator. (L24, AY, C-n)

34-L. Finishing Plant Engineering. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 19, 22, 24, 28-30, 32-48, 50, 52, 54-58, 60-62, 64-66, 68-70, 74, 76, 78, 80-84, 86, 88, 90, 92, 94, 96, 98, 100-104, 106-114.

Consists of following papers: "Plating-Room Layout", J. J. Martin, Jr., "Plating Room Floor Construction", V. A. Curll; "Mechanical Exhaust for Plating Rooms", B. F. Postman; "Choosing the Full Automatic", John V. Davis; "Essentials of Plating Rack Design", William E. Belke; "Electrical Power for Plating. I. Motor-Generators", A. P. Munning. "II. Rectifiers", Philip P. Bruno; "Calculating Voltage Drops in Bus Bars", Raymond F. Ledford; "Corrosion Resistant Tanks and Linings", Paul G. McDermott; "Protective Coatings in the Plating Industry", Raymond B. Seymour; and "Control and Treatment of Metal Finishing Wastes", David Milne. (L17)

35-L. Mechanical Surface Preparation. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156-166, 168-172.

Consists of the following papers: "Polishing and Buffing", H. L. Kellner; "Abrasives and Compounds for Polishing and Buffing", Howard J. McAleer; and "Barrel Finishing", Peter L. Veit. (L10)

36-L. Chemical Surface Preparation. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 173-174, 176-182, 184, 186-190, 192-194, 196-204, 206-245.

Consists of the following papers: "Pickling and Acid Dipping", Nathaniel Hall and G. B. Hogaboom, Jr.; "Solvent Vapor Degreasing", G. W. Walter; "Metal Cleaning", S. Spring; "Preparation of Various Base Metals for Plating", Walter A. Raymond; "Surface Preparation of Aluminum for Plating", J. F. O'Keefe; "Electroplating on Magnesium Alloys", Myron B. Diggin; "Preparation of Metals for Hard Chrome Plating", Arthur Logozzo; "Stripping Metallic Coatings", Nathaniel Hall, G. B. Hogaboom, Jr., and J. B. Mohler; and "Electropolishing", Charles L. Faust. (L12, L13, L17)

37-L. Plating Solutions and Operating Data. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266-270, 272, 274, 277, 278, 280, 282-284, 286-290, 293-310, 312-314, 316-318, 320-322, 324, 326-332, 334-336, 338, 340-344, 346-363.

Consists of the following papers: "Brass and Bronze Plating", G. B. Hogaboom, Jr. and Nathaniel Hall; "White Brass Alloy Plating", A. E. Chester and Bruno Leonelli; "Cyanide Cadmium Plating", R. O. Hull; "Chromium Plating", George Dubpernell; "Acid Copper Plating", W. A. Raymond; "Cyanide Copper Plating", Henry A. Strow; "Fluoborate Copper Plating", A. E. Carlson and Clifford Struyk; "Gold Plating", Edward A. Parker; "Indium Plating", Daniel Gray; "Iron Plating", Almo D. Squitero; "Lead Plating", F. C. Mathers; "Lead-Tin Alloy Plating", A. E. Carlson and C. Struyk; "Nickel Plating", Walter H. Prine; "Bright Nickel Plating", H. Bandes; "Black Nickel Plating", John G. Poor; "High-Speed Nickel Plating From Sulfamate Baths", R. C. Barrett; "Palladium Plating", K. Schumpelt; "Platinum Plating", K. Schumpelt; "Rhodium Plating", K. Schumpelt; "Silver Plating", N. E. Promisel; "Speculum Plating", A. E. Chester and Bruno Leonelli; "Tin Plating From Acid Baths", F. C. Mathers; "Tin Plating From the Fluoborate Bath", A. E. Carlson and Clifford Struyk; "Tin Plating From Alkaline Stannate Baths", Frederick A. Lowenheim; "Plating Tin-Zinc Alloys", Frederick A. Lowenheim; "Acid Zinc Plating", R. O. Hull; "Zinc Plating From Fluoborate Solutions", A. E. Carlson and Clifford Struyk; "Cyanide Zinc Plating", R. O. Hull; and "Bright Cyanide Zinc Plating", R. R. Bair. (L17)

38-L. Special Plating Procedures. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 365-381, 383, 386, 388, 404.

Consists of the following papers: "Periodic Reverse Current Electroplating", George W. Jernstedt; "Diaphragms for Copper Plating Tanks", Ralph H. McCahn; "Plating on Plastics", Harold Narcus; "Filtration of Plating Solutions", Harold W. Faint; "Activated Carbon Treatment of Plating Solutions", Walter A. Helbig; "Purification of Plating Solutions by Low Current Density Electrolysis", C. E. Naylor; and "Deionization for Electroplaters", W. S. Morrison. (L17)

39-L. Special Surface Treatments. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 405-412, 414-428, 430-432, 434, 436, 438-440, 442-448, 450-451.

Consists of the following papers: "Sulphuric Acid Anodizing Process", Milton Nadel; "Chromic Acid Anodizing Process", G. B. Hogaboom, Jr. and Nathaniel Hall; "Coloring Anodized Aluminum", Edward Washburn; "Surface Treatments for Magnesium", Myron B. Diggin; "Coloring of Metals", George B. Hogaboom; and "Chemical Conversion Coatings for Zinc and Cadmium Surfaces", Joseph Mazia. (L14, L19)

40-L. Control-Analysis-Testing. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 453-454, 456, 458, 460-486.

Consists of the following papers: "Control of Plating Baths With Plating Cells", R. O. Hull; "Testing of Electrodeposits", Walter H. Prine; and "Nomograph on Thickness of Electrodeposits", Arthur S. Covert. (L17)

41-L. Making Additions to Plating Solutions. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 489-490.

Table gives pounds of any chemical required to bring a bath up to specifications, for various sizes of tanks. (L17)

42-L. Metal Content of Common Plating Salts. Nathan E. Promisel. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 491-492.

Table. (L17)

43-L. Determining Surface Area From the Weight of Steel Sheet Metal Parts (Stampings). *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 495-497.

Charts. (L17, G3, ST, Cu, Al)

44-L. Buffing and Polishing Wheel Speeds. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 501.
Table. (L10)

45-L. Calculating Metal Costs. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 502-509.
Charts for Cd, Zn, Sn, Cu, Ni, Cr, Ag, and Au. (L general, A4)

46-L. Architectural Letters in Metallised Plastic. D. McPherson. *Metallurgia,* v. 46, Nov. 1952, p. 249-250.
Development of metallized plastics process and typical applications. (L23)

47-L. LTF Gives Details on Bi-Metal Plate, Roller-Plating, Other Developments. *Modern Lithography,* v. 20, Dec. 1952, p. 51-52, 59, 73-74, 123.
Past developments and method for plating Cu on Al. (L17, L22, Cu, Al)

48-L. Production and Uses of Clad Steel Plate. Heinrich Canzler. *Petroleum,* v. 15, Dec. 1952, p. 326-327, 346.
Production by hot rolling. Plant design data. Photographs and tables. (L22, F23, SS)

49-L. Electropolishing and Its Applications. C. E. Naylor. *Plating Notes,* v. 4, Aug. 1952, p. 115-125.
Includes tabulated data. 14 ref. (L13, SS, Al, AY, CN)

50-L. Aluminium Coatings—A Review. T. A. Hood. *Plating Notes,* v. 4, Aug. 1952, p. 126-131.
15 references. (L general, Al)

51-L. Applications Extended for Aluminum Bonding. *Product Engineering,* v. 23, Dec. 1952, p. 134-137.
The bonding of pure Al and any of its common casting alloys, such as Alcoa 43, 122, 132, 142, 195, 220, 335, 356, to gray, malleable, ductile or nodular and austenitic irons, carbon, alloys, and stainless steels, Inconel, and Nimonic series and titanium by the Al-Fin process. Typical applications. (L22, Al)

52-L. Anodizing Aluminum With Oxalic Acid. Sakae Tajima. *Products Finishing,* v. 17, Dec. 1952, p. 42-56, 58, 60.
Development of process and present techniques. Charts and tables. 14 ref. (L19, Al)

53-L. Analyze Finish Application Troubles. Allen G. Gray. *Products Finishing,* v. 17, Dec. 1952, p. 66, 68, 70, 72, 74, 76, 78, 80.
Many common troubles encountered in painting and their remedies. Tables and diagrams. (L26)

54-L. Heating Pickle Liquor By Submerged Combustion. W. I. Weisman. *Steel,* v. 131, Dec. 15, 1952, p. 114, 116.
New type pickle liquor heater with a graphite burner for direct firing of natural gas and having long life in corrosive solutions. (L12)

55-L. (Book—French.) **(Chromium Plating: Techniques and Applications.) Chromage: Technique et Applications.** Paul Morisset. 477 pages. 1952. Marval, 31 Villa d'Allesia, Paris. 4500 fr.
Provides a summary, in a practical form suitable for industry, of published information about Cr plating. Emphasis is on engineering rather than decorative applications. Material is arranged to permit rapid reference. Divided into four parts: theory of electrolysis, technique of Cr plating, characteristic properties, and industrial applications. 243 ref. (From review in *Metallurgical Abstracts)* (L17, Cr)

56-L. (Book—German.) **(Coloring of Metal.) Metallfärbung.** Ed. 3. H. Krause. 166 pages. 1951. Carl Hanser Verlag, Munich 27, Germany. 12.50 DM.
The more important processes are treated in more detail than in former editions. Several less important phases are omitted. New developments include phosphating, Mo solutions for coloring, and coloring of light metal alloys. (L14)

AMERICAN CHEMICAL PAINT COMPANY
AMBLER CHEMICALS ACP PROCESSES **PENNA.**

Technical Service Data Sheet
Subject: INDEX OF ACP CHEMICALS FOR METAL PRESERVATION AND PAINT PROTECTION

METAL	OPERATION	ACP CHEMICAL
ALUMINUM	*Cleaning*	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Preparation for Painting	"ALODINE" "DURIDINE" "DEOXIDINE"
	Protection from Corrosion	"ALODINE"
BRASS	*Brightening*	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK
	Corrosion Prevention	"CUPROTEK"
	Soldering Flux	"FLOSOL"
COPPER, BERYLLIUM, AND COPPER ALLOYS	*Brightening*	"ACP BRIGHT DIP"
	Cleaning	"DEOXIDINE" "DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "CUPROTEK"
	Coating Steel with Copper	"CUPRODINE"
	Corrosion Prevention	"CUPROTEK"
	Scale Modification	"RIDOXINE"
	Soldering Flux	"FLOSOL"
	Stripping Copper Coatings	"ACP COPPER STRIPPING SOLUTION"
GALVANIZED IRON, ZINC, AND CADMIUM	*Cleaning*	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Corrosion Proofing	"ZINODINE"
	Paint Bonding	"ZINODINE"
	Phosphate Coating, in Preparation for Painting	"LITHOFORM"
	Soldering Flux	"FLOSOL"
IRON AND STEEL	*Chromate Coating, in Preparation for Painting*	"CROMODINE"
	Cleaning	"ACP RIDOLINES AND RIDOSOLS"
	Cleaning for Painting	"DEOXIDINE" "DURIDINE"
	Coating with Copper	"CUPRODINE"
	Drawing and Extrusion	"GRANODRAW"
	Paint Bonding	"CROMODINE" "DURIDINE" "GRANODINE" "PERMADINE" "THERMOIL-GRANODINE"
	Paint Stripping	"CAUSTIC SODA AND SOLVENT NO. 3"
	Phosphate Coating, in Preparation for Painting	"DURIDINE" "GRANODINE" "PERMADINE" "THERMOIL-GRANODINE"
	Phosphate Coating, to Protect Friction Surfaces	"THERMOIL-GRANODINE"
	Pickling with Inhibited Acids	"RODINE"
	Rust Prevention for Unpainted Iron	"PEROLINE"
	Rust Proofing	"PERMADINE" "THERMOIL-GRANODINE"
	Rust Removal—Brush, Dip, or Spray	"DEOXIDINE"
	Soldering Flux	"FLOSOL"
MAGNESIUM	*Cleaning*	"DURIDINE" "ACP RIDOLINES AND RIDOSOLS"
	Pickling	"RODINE (M-200)"
STAINLESS STEEL	*Cleaning*	"DEOXIDINE"
	Coating with Copper	"CUPRODINE"
	Pickle Polishing	"RODINE"
	Soldering Flux	"FLOSOL"

CHEMICALS ACP PROCESSES

WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

57-L. (Book.) **Hot Dip Galvanizing of General Work.** 57 pages. Aug. 1951. Anglo-American Council on Productivity, 2 Park Ave., New York 16, N. Y.; or 21 Tothill St., London, S.W. 1, England.

Equipment, process, and treatment of residues. (L16, CN, Zn)

58-L. (Book.) **Metal Finishing.** 75 pages. Nov. 1951. Anglo-American Council on Productivity, 2 Park Ave., New York 16, N. Y.; or 21 Tothill St., London, S.W. 1, England.

Report of a visit to the U. S. in 1950 of a specialist team representing the British metal-finishing industry. (L general)

59-L. (Book—French.) **(Protection of Metal Surfaces Against Corrosion: Nonelectrolytic Procedures.) Protection contre la Corrosion des Surfaces Métalliques: Procédés Non-Electrolytiques.** P. Tyvaert. 86 pages. 1951. Revue d'Optique, 165 rue de Sevres, Paris 15, France.

A summary of a course given at Institut Supérieur des Matériaux et de la Construction Mécanique. Deals with preparation of metal surfaces by degreasing and by various mechanical and chemical methods for removing oxide and scale, vitreous enameling, formation of metallic coatings by various nonelectrolytic methods such as hot dipping, metal spraying, cladding, cementation, and chemical displacement, and methods of forming chemical conversion coatings on ferrous metals, Al, Mg, Zn, and their alloys. (L general)

60-L. (Book.) **Romancing in Tin Plate.** Roy Rutherford. 124 pages. 1951. Wean Engineering Co., Warren, Ohio.

Serves as a history of tin, iron, and steel and their eventual relationship in tinplate. Application in can-making and canning industries. (L17, A2, T29, Sn, Fe)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

1-M. **The Structure and Properties of Magnetic Alloys.** D. W. Davison. *Australasian Engineer,* Sept. 8, 1952, p. 44-49.

Both main classes of ferromagnetic materials are discussed, namely, "hard" alloys for permanent magnets and "soft" alloys for coil cores. Deals particularly with atomic arrangements found in these alloys. Diagrams of lattice geometry are included for most of the structures and various magnetic properties are tabulated, alloy names being entered in descending order against a vertical scale of selected magnetic quantity. (M27, P17, SG-n, p)

2-M. **Free Iron in Brass Ingot.** *Metal Industry,* v. 81, Nov. 7, 1952, p. 364.

Determination by micro-examination, chemical analysis, and magnetic separation. (M27, S11, Cu)

3-M. **Application of Fluorescence X-Rays to Metallurgical Microradiography.** H. R. Splettstosser and H. E. Seemann. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1217-1222.

Shows that fluorescence X-rays may be more useful analytically in metallurgical microradiography than line emission from a tube target because of greater homogeneity of the former radiation. Although intensity of fluorescence is low, exposure times are not prohibitive for some applications. Method and apparatus and illustrative examples are shown. Microradiographs. (M23)

4-M. **An X-Ray Diffraction Study of the Hafnium-Hydrogen System.** S. S. Sidhu and J. C. McGuire. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1257-1260.

Limit of solid solubility of H_2 in Hf, number of Hf-H phases formed and their crystalline structures. Diagrams, graphs, tables, and micrographs. (M24, Hf)

5-M. **The Gold-Platinum System.** A. S. Darling, R. A. Mintern, and J. C. Chaston. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 125-132.

Results of a re-investigation of equilibrium diagram of the Au-Pt system confirming a continuous series of solid solutions below the solidus. Transformations in the solid state below 1000° C. were not studied. Diagrams and charts. (M24, Au, Pt)

6-M. **Direct Examination of Solid Surfaces Using a Commercial Electron Microscope in Reflection.** J. W. Menter. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 163-167.

Modifications necessary for conversion of Metropolitan Vickers EM3 electron microscope for use in direct examination of solid surfaces by reflection. Diagrams and micrographs. 14 ref. (M21)

7-M. **A Thermal and Microscopic Study of the Iron-Carbon-Silicon-System.** J. E. Hilliard and W. S. Owen. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 268-282.

Constant-Si sections of the metastable Fe-C-Si diagram at 2.3%, 3.5%, 5.2%, and 7.9% Si were determined by thermal analysis and microscopic study of vacuum-melted high-purity alloys. Projections on two binary sides and four isothermal sections of the system are reproduced. Diagrams, tables, and micrographs. 28 ref. (M24, Fe, AY)

8-M. **Nature of the Line Markings in Titanium and Alpha Titanium Alloys.** C. M. Craighead, G. A. Lenning, and R. I. Jaffee. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1317-1319.

Nature of the fine line markings which appear in the microstructures of unalloyed Ti. Typical examples variously called x phase, etching pits, and twins are shown. (M27, Ti)

9-M. **Modifications of an X-Ray Method for the Measurement of Retained Austenite Concentrations in Hardened Steels.** Karl E. Beu. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1327-1328.

Several modifications which reduce time and increase accuracy. Typical results. (M23, ST)

10-M. **Structure and Crystallography of Second Order Twins in Copper.** M. Sharp and C. G. Dunn. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1344.

Formation of twins and second-order twins in cubic metals. Examples of the latter. (M27, Cu)

11-M. **The ABC of Titanium Alloys.** Walter L. Finlay. *Metal Progress,* v. 62, Nov. 1952, p. 73-78.

α, β, and α-β phases are used to explain the general features of Ti-base alloys. Data on mechanical properties, crystal structures, forming characteristics, and equilibrium diagrams. (M26, Q general, Ti)

12-M. **Colour Etching of Iron and Steel. Various Etchants to Reveal Physical and Chemical Heterogeneities.** L. Beaujard. *Metal Treatment and Drop Forging,* v. 19, Nov. 1952, p. 499-503.

Use of caustic-soda solutions with oxidizing agents to reveal chemical and physical heterogeneities of steel specimens. Diagrams and photomicrographs. (M21, ST, Fe)

13-M. **Screw Dislocations, Etch Figures, and Holes.** F. Hubbard Horn. *Philosophical Magazine,* ser. 7, v. 43, Nov. 1952, p. 1210-1213.

Etch figures similar in appearance to those observed in mineralogical technique are shown to result from rapid chemical dissolution of growth spirals on silicon carbide. Shows that prolonged rapid dissolution of a crystal with a screw dislocation extending between opposite crystal faces results in a hole through the crystal at the site of the screw dislocation. Micrographs. (M26, Si)

14-M. **An Effect of Electron Bombardment on Order in Cu_3Au Alloy.** J. Adam, A. Green, and R. A. Dugdale. *Philosophical Magazine,* ser. 7, v. 43, Nov. 1952, p. 1216-1218.

Experiment designed to study part played by lattice defects introduced by high-energy electron bombardment. (M26, Cu, Au)

15-M. **Methods in Electron Microscopy of Solids.** R. D. Heidenreich. *Review of Scientific Instruments,* v. 23, Nov. 1952, p. 583-594.

Methods of replicating solid surfaces for electron microscopy are reviewed and compared. Preparation of metal surfaces for electron microscopy, and advantages of employing electron diffraction techniques in evaluating prepared surfaces. Examples of application of replicas include steel, precipitation in alloys, such as Alnico 5, and studies of slip in Al. Use of thin metal sections and of emission electron microscopy in studying metallic structures. Micrographs. 24 ref. (M21, ST, SG-n)

16-M. (English.) **Aluminium Monochromator With Double Curvature for High-Intensity X-Ray Powder Photographs.** G. Hägg and N. Karlsson. *Acta Crystallographica,* v. 5, Nov. 10, 1952, p. 728-730.

Construction and performance of above monochromator in which the point-focus is used for taking powder photographs of the Guinier type. (M22, Al)

17-M. (English.) **An X-Ray Powder Study of β-Uranium.** J. Thewlis. *Acta Crystallographica,* v. 5, Nov. 10, 1952, p. 790-794.

Description of the powder pattern of β-Uranium and the Debye characteristic temperature and thermal expansion coefficients of β-Uranium and UO_2. Graphs and tables. (M22, P11, U)

18-M. (English.) **The Crystallographic Relationship Between the Phases γ and ε in the System Iron-Manganese.** J. Gordon Parr. *Acta Crystallographica,* v. 5, Nov. 10, 1952, p. 842-843.

Brief description. Micrographs. (M24, Fe, Mn)

19-M. (Russian.) **Anisotropic Distortion of the Crystalline Lattice of Martensite.** V. A. Il'ina, V. K. Kritskaia, and G. V. Kurdiumov. *Doklady Akademii Nauk SSSR,* v. 85, Aug. 11, 1952, p. 997-999.

1.3% C steel was used for X-ray diffraction studies of lattice distortion. (M22, CN)

20-M. **The Chromium Corrosion and Heat Resisting Steels.** H. R. Dalziel. *Australasian Engineer,* Oct. 7, 1952, p. 52-57.

Constitution of high-Cr steels, heat treatment of high-Cr steels, Fe-Cr-C ternary system, effect of other alloying elements, and typical steels and their uses. Diagrams and tables. (M24, J general, SS, SG-g, h)

21-M. **Ferrite in Austenitic Steels Estimated Accurately.** T. V. Simpkin-

son. *Iron Age,* v. 170, Dec. 11, 1952, p. 166-169.

Calibration curves which simplify estimation of ferrite in cast and wrought steel products with the Aminco-Brenner Magne-Gage using carbonyl and electrolytic iron powders in bakelite compacts. Charts and photomicrographs. (M23, Fe, SS)

22-M. Liquidus Surface of the Fe-S-O System. D. C. Hilty and Walter Crafts. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1307-1312.

The liquidus diagram for the iron field of the Fe-S-O system was derived experimentally. The solubility of oxygen in molten Fe-S alloys was measured at several temperatures and found first to decrease slightly and then increase rapidly with increasing sulphur content. Diagrams, tables, and micrographs. (M24, Fe)

23-M. Electron Microscopy of Solid Surfaces. V. E. Cosslett. *Nature,* v. 170, Nov. 22, 1952, p. 861-863.

Instrument for making micrographs of steel, Al, Ni-plated brass and Zn without replicas.
(M21, ST, Al, Cu, Zn)

24-M. Microconstituents in Chromium-Base Chromium-Iron-Molybdenum Alloys and Their Behavior With Heat Treatment. Joseph P. Hammond, Arthur B. Westerman and Howard C. Cross. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1329-1342.

Phases in Cr-Fe-Mo alloys were investigated with homogenization, aging temperature, composition range, and alloy addition as variables. Metallography, three X-ray methods, and hardness were used as methods of study. Composition range of 60% Cr, 15-25% Fe, 15-25% Mo, 0.005-0.36% C with aging at 1400-2000° F. was investigated. With 2% Ti, TiC and TiN are formed; with nitrogen Cr_2N. Tables and micrographs. 10 ref. (M27, J general, Cr)

25-M. (Book.) **Metallurgical Equilibrium Diagrams.** W. Hume-Rothery, J. W. Christian, and W. B. Pearson. 311 pages. 1952. The Institute of Physics, 47 Belgrade Sq., London S.W.1, England. 50s.

A general discussion of known experimental methods, with detailed description of apparatus used in each case and the principles on which it operates; determination of freezing point curve or liquidus; determination of melting point curve or solidus; and determination of boundaries between crystals, defined by temperature and composition, and between constituents of an alloy in solid or semi-solid state.
(M24)

26-M. (Book—German.) **(Outline of General Metallography.) Grundriss der allgemeinen Metallkunde.** E. Brandenberger. 333 pages. 1952. Ernst Reinhardt Verlag, Basel, Switzerland. Paperbound, 14; Clothbound, 16.50 Swiss francs.

Concerned with a general discussion of principles underlying metallography of both ferrous and nonferrous metals. Divided into 5 sections; metallography of pure metals, substitutional solid solutions, intermediate phases and intermetallic compounds, and chemical reactions of metals with solid, liquid, and gaseous phases.
(M general, N general)

27-M. (Book.) **The Phase Rule and Its Applications. Ed. 9.** Alexander Findlay. Revised and enlarged by A. N. Campbell and N. O. Smith. 494 pages. 1951. Dover Publications, Inc., 1780 Broadway, New York 19, N. Y. Paperbound, $1.90; Clothbound, $5.00.

Provides a clear exposition of general principles of all types of equilibrium relationships that can be represented in phase diagrams. (M24, N6)

28-M. (Book — Russian.) **Structural Crystallography.** N. V. Belov. 88 pages. Academy of Sciences of the U.S.S.R., Publishing House, Moscow. 4 rubles.

Consists of four lectures for postgraduate students designed to explain nature and properties of the space lattice. (M26)

N TRANSFORMATIONS AND RESULTING STRUCTURES

1-N. The Nature of Solids. Gregory H. Wannier. *Scientific American,* v. 187, Dec. 1952, p. 39-48.

How theory explaining characteristics of substances in the solid state has led to the development of such practical devices as the transistor. Diagrams. (N general)

2-N. Development of Porosity During Diffusion in Substitutional Solid Solutions. R. W. Balluffi and B. H. Alexander. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1237-1244.

Metallographic study made of diffusion zones present in Cu-α-brass, Cu-Ni, and Au-Ag diffusion couples. Experiments include quantitative study of rate of porosity formation in α-brass during dezincification, study of porosity that develops in sandwich-type diffusion couples, and study of diffusion zone after diffusing metals from vapor phase into solid phase. Micrographs and graphs. (N1, Cu, Ni, Au, Ag)

3-N. The Effect of Cyclotron Bombardment on Self-Diffusion in Silver. R. D. Johnson and A. B. Martin. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1245-1254.

Radioactive-tracer techniques were employed to measure rate of self-diffusion in Ag in polycrystalline and single crystal solvents over a wide range of temperatures, and to investigate effect of bombardment with 10-Mev. protons on this diffusion process. Cyclotron techniques and apparatus. Diagrams, graphs, and tables. (N1, Ag)

4-N. Effect of Quench Ageing on Strain Ageing in Iron. A. H. Cottrell and G. M. Leak. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 301-306.

Effects of C and N_2 on strain aging and quench aging were examined by stress-strain measurements of soft Fe wire. Freshly quenched specimens were found to strain-age five times faster than those quench aged at 120-300° C. Only in the freshly quenched material is C more important than N_2. (N7, ST)

5-N. The Formation of Bainite. T. Ko and S. A. Cottrell. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 307-313.

By studying surface relief during the formation of bainite, it was established that it forms by nucleation and slow coherent growth. A new theory of the mechanism of bainite formation is proposed. It is suggested that the rate of growth is controlled by the rate of C removal. Tables, charts, and photomicrographs. 40 ref. (N8, ST)

6-N. Effect of a Prequench on the Martensite Reaction in Tool Steel. John J. Gilman. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1300-1301.

Recent experiments have shown that the martensite reaction proceeds to a given extent at a higher temperature in austenite formed from an annealed spheroidal structure than it does in austenite formed from tempered martensite. Furthermore, a prequench alters the appearance of the martensite as compared to martensite formed from "virgin" austenite. (N8, TS)

7-N. Relative Diffusion Rates of Zinc and Copper in Alpha Brass. R. W. Balluffi and B. H. Alexander. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1315-1316.

Relative diffusion rates of copper and zinc in brass were measured in a vapor-solid type of couple with which amounts of copper and zinc diffusing past inert Kirkendall markers can be obtained by means of a few simple experimental measurements. (N1, Cu, Zn)

8-N. Principles Involved in the Formation of Iron Alloys. (Continued.) K. W. Andrews. *Metal Treatment and Drop Forging,* v. 19, Nov. 1952, p. 489-498.

Further empirical relationships are discussed for establishing fundamental principles involved in formation of iron alloys. Application of electronic theory of elements. Graphs and diagrams. 19 ref.
(N general, P10, Fe)

9-N. Orientation Studies of Exaggerated Grain Growth in Tungsten. Fred D. Rosi. *Sylvania Technologist,* v. 5, Oct. 1952, p. 82-86.

Studies of tungsten wire doped with alumina were made. Theoretical considerations were advanced on the origin of coarse grains and effect of impurities at grain boundaries. Graphs and diagrams. 21 ref. (N3, W)

10-N. (English.) **Crystal Growth and Orientation in Deposits Condensed From the Vapour.** D. M. Evans and H. Wilman. *Acta Crystallographica,* v. 5, Nov. 10, 1952, p. 731-738.

Nature of crystal orientation in deposits of Zn, Cd, Sb, Bi, Fe, NaCl, NaF, and PbS, condensed from vapor upon smooth substrates initially at room temperature, is investigated by electron diffraction. Diagrams, graphs and tables. 51 ref. (N15)

11-N. (English.) **Crosses Observed in the Electron-Diffraction Pattern of an Orientated CuAu Film.** Shiro Ogawa and Denjiro Watanabe. *Acta Crystallographica,* v. 5, Nov. 10, 1952, p. 848-849.

The order-disorder problem of CuAu in the form of a thin film. Diagrams. (N10, Au, Cu)

12-N. (Russian.) **The Use of Artificially Radioactive Indicators for the Study of Diffusion and Self-Diffusion Processes in Metals. Self-Diffusion of Cobalt.** P. L. Grugin. *Doklady Akademii Nauk SSSR,* v. 86, Sept. 11, 1952, p. 289-292.

Co^{60} was used in this study. Method is described and data are discussed and tabulated. (N1, S19, Co)

13-N. Isothermal Ordering of Cu_3Au at 200° C. E. K. Halteman, G. F. Mechlin, and H. L. Glick. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1205.
(N10, Cu, Au)

WESTERN METAL CONGRESS
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P

PHYSICAL PROPERTIES AND TEST METHODS

1-P. Superconductivity of Indium-Thallium Solid Solutions. J. W. Stout and Lester Guttman. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 703-712.

Measurements on superconducting properties of In-Tl solid solutions in composition range from pure In to 50% Tl. Magnetic induction and electrical resistance were measured at various temperatures and magnetic field strengths. Single-crystal specimens of composition 0, 5, 10, 15, and 20 atom % Tl, and polycrystalline specimens containing 15, 20, 38, and 50% Tl, were investigated. Critical fields for destruction of superconductivity are given for range 0-20% Tl and electronic heat capacities of normal metal are calculated. Graphs and tables. 10 ref. (P15, In, Tl)

2-P. The Electrical Resistivity of Indium-Thallium Solid Solutions. J. W. Stout and Lester Guttman. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 713-714.

Measurements were made in composition range from 100% In to 50 at. % Tl and from boiling point of He to room temperature. Tables. (P15, In, Tl)

3-P. Grain Boundary Barriers in Germanium. W. E. Taylor, N. H. Odell, and H. Y. Fan. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 867-875.

High resistance at grain boundaries in *n*-type Ge was investigated. Theory developed assumes existence of surface states at the boundary. Ability of barriers to withstand about 100 volts is explained. D.C. conductance of barrier, measured at different temperatures, agrees with theory in dependence on temperature as well as in order of magnitude. Results are in agreement with theory, showing that at low temperatures the current across the boundary is mainly carried by electrons, hole current becoming increasingly important as temperature is raised. Graphs. 13 ref. (P15, M26, Ge)

4-P. Interpretation of the Electron-Inertia Experiment for Metals With Positive Hall Coefficients. Norman Rostoker. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 952-953.

Author's interpretation of a previous paper which described measurements of e/m for the conduction electrons of metals such as Mo and Zn. (P15, Mo, Zn)

5-P. Changes in Electrical Properties of Cold Worked Metals. T. Hirone and K. Adachi. *Engineers' Digest,* v. 13, Nov. 1952, p. 394-395. (From *Science Reports of the Research Institute of Tohoku University,* ser. A, Vol. 3, No. 4, 1952, p. 454-458.)

Brief theoretical analysis. (P15)

6-P. A New Permanent Magnet From Powdered Manganese Bismuthide. Edmond Adams, William M. Hubbard, and Albert M. Syeles. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1207-1211.

Selection of material, history, preparation of MnBi, pulverization and separation, compaction into magnets, evaluation, and comparison with present magnets. (P17, H general, SG-n, Bi, Mn)

7-P. The Polarization of Acoustic Waves in Cubic Crystals. A. E. Fein and Charles S. Smith. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1212-1213.

Ni as a typical example is used to determine directions of particle motion associated with acoustic waves. Results are shown graphically. (P10, Ni)

8-P. Hydrogen Overvoltage on Bright Platinum. Sigmund Schuldiner. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 488-494.

Method of determining surface cleanliness of Pt cathode was developed, and Pt overvoltage curves in various concentrations of H_2SO_4 and 0.1 N K_2SO_4 were determined. Diagrams, graphs, and tables. 18 ref. (P15, Pt)

9-P. The Electrochemical Behavior of Aluminum. In Buffered and Alkaline Solutions of Potassium Ferricyanide and in Sodium Hydroxide. J. V. Petrocelli, *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 513-519.

Study of the reactivity and polarization characteristics of pure Al in buffered and alkaline solutions of $K_3Fe(CN)_6$ and in NaOH. Electrode potentials, weight loss data, and polarization curves. Analysis of polarization behavior is based on the theory of the "mixed potential." Graphs. (P15, Al)

10-P. A Polarographic Method for the Indirect Determination of Polarization Curves for Oxygen Reduction on Various Metals. III. Chromium, Molybdenum, Tantalum, Titanium, Tungsten, and Zirconium. Paul Delahay and Lee J. Stagg. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 546-548.

Presents polarization curves for O_2 reduction on Cr, Mo, Ta, Ti, W, and Zr. Appreciable amounts of H_2O_2 are formed on all except Zr and Mo. (P15, R1, Cr, Mo, Ta, Ti, W, Zr)

11-P. Diffusion and Convection in Electrolysis. A Theoretical Review. C. W. Tobias, M. Eisenberg, and C. R. Wilke. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 359C-365C. Diagrams. 30 ref. (P15, L17, C23)

12-P. Thermal Scattering of Light in Cubic Crystals. V. Chandrasekharan. *Journal of the Indian Institute of Science,* v. 34, sec. A, Oct. 1952, p. 269-286.

Theory for intensities of Doppler components in birefringent crystals was applied to cubic crystals and general expressions for intensities for 11 specific orientations of crystals were derived. Extensive tables. 19 ref. (P17)

13-P. The Viscosity of Aluminium and Binary Aluminium Alloys. W. R. D. Jones and W. L. Bartlett. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 145-152.

A study was made of variation of viscosity with temperature for pure Al and binary Al alloys. Results show a characteristic change point at 760-770° C. Diagrams and charts. (P10, Al)

14-P. Thermodynamic Properties of Solid Nickel-Gold Alloys. L. L. Seigle, Morris Cohen, and B. L. Averbach. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1320-1327.

Free energies, enthalpies, and entropies of mixing of Ni-Au solid solutions containing 5 to 95 atomic % Ni were determined at 700 to 900° C. Thermodynamic activities exhibit large positive deviations from Raoult's law. Enthalpies of mixing are positive (heat is absorbed) and are attributable to the lattice distortional energy resulting from size difference between nickel and gold atoms. Diagrams, tables, and graphs. 25 ref. (P12, Ni, Au)

15-P. Increase of High Magnetostriction by Magnetic Anneal. H. E. Stauss and G. Sandoz. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1342-1343.

Studies were made on two alloys —87% Fe, 13% Al; and 69% Co, 31% Fe. An increase of 1.2 times was obtained. Data are tabulated. (P16, Fe, Al, Co)

16-P. A Method of Measuring the Magnetic Permeability of Rod Specimens. H. Aspden. *Journal of Scientific Instruments,* v. 29, Nov. 1952, p. 371-374.

Method using search coil and fluxmeter. It is extended by connecting in opposition the field search coil and flux search coil so that arrangement can be used as a sensitive flux-balance indicator and so that accuracy of a permeability measurement is rendered substantially independent of fluxmeter errors. (P16)

17-P. Thermionic Constants of the Iron Group of Metals. K. S. Krishnan and S. C. Jain. *Nature,* v. 170, Nov. 1, 1952, p. 759.

Method for determination of thermionic constants of Cr, Fe, Co, and Ni, by depositing metals both electrolytically and by evaporation from a tungsten wire coated previously with the metal, or carrying small rings of the metal. (P15, Cr, Fe, Co, Ni)

18-P. The Effect of Neutron Bombardment on the Low Temperature Atomic Heat of Silicon. P. H. Keesom, K. Lark-Horovitz, and N. Pearlman. *Science,* v. 116, Dec. 5, 1952, p. 630-631.

Experiments at Purdue with 10-mev. deuterons and at Oak Ridge with fast neutrons which indicate that irradiation produces both electron and hole traps in Si. Table. 11 ref. (P10, Si)

19-P. (Russian.) **Change of Electrical Resistance of Single Crystals of Transformer Steel in a Magnetic Field.** T. D. Zotov and Ia. S. Shur. *Doklady Akademii Nauk SSSR,* v. 86, Sept. 11, 1952, p. 267-269.

An experimental study was made on the Thomson effect in single crystals of 3.5%-Si steel. Data are charted. 11 ref. (P15, AY)

20-P. (Russian.) **Measurement of Heat Capacity of Metals at Very Low Temperatures (Cadmium From 0.3 to 0.9° K.).** B. N. Samoilov. *Doklady Akademii Nauk SSSR,* v. 86, Sept. 11, 1952, p. 281-284.

Method of determination. Data are discussed and charted. (P12, Cd)

21-P. Densities of Commonly Plated Metals. *Metal Finishing,* Guidebook-Directory Issue, 1953, p. 500. Table. (P10, L17)

22-P. The Resistivity of Lanthanum, Cerium, Praseodymium, and Neodymium at Low Temperatures. N. R. James, S. Legvold, and F. H. Spedding. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1092-1098.

Resistivity from room temperature to 2.2° K is presented. Effect of crystal structure and purity on electrical resistivity. Graphs and tables. (P15, La, Ce, Pr, Nd)

23-P. The Specific Heat of Lead in the Temperature Range 1° K to 75° K. M. Horowitz, A. A. Silvidi, S. F. Malaker, and J. G. Daunt. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1182-1186.

Measured calorimetrically, both in the normal and superconductive states by means of a semi-automatic recording system. Tables and graphs. 16 ref. (P12, Pb)

24-P. Spin-Lattice Relaxation in Ferromagnets. Elihu Abrahams and

C. Kittel. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1200.

Introduces a spin-wave field by expanding the transverse components of magnetization into normal modes and quantizing according to commutation relations between the components of atomic spin. A macroscopic phonon field is set up to describe lattice vibrations in an elastically isotopic solid. Results for Ni. (P16, Ni, Sg-n, p)

25-P. The Concept of Spin-Lattice Relaxation in Ferromagnetic Materials. P. W. Anderson. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1214.

(P16, SG-n, p)

26-P. Some Properties of Superconductors Below 1° K. III. Zr, Hf, Cd, and Ti. T. S. Smith and J. G. Daunt. *Physical Review,* ser. 2, v. 88, Dec. 1, 1952, p. 1172-1176.

Using techniques for measurement of magnetic threshold curves of superconductors below 1° K. previously employed, investigations were made on Cd, Zr, Hf, and Ti, both before and after heat treatment. Tables.

(P15, Zr, Hf, Cd, Ti)

27-P. The Isotope Effect in Superconductivity. E. Maxwell. *Physics Today,* v. 5, Dec. 1952, p. 14-18.

A recently discovered phenomenon in the behavior of superconducting elements. (P15)

28-P. Magnetostrictive Effect and the Δ-E Effect in Nickel. Henrik Nödtvedt. *Nature,* v. 170, Nov. 22, 1952, p. 884-885.

Experiments in connection with sound propagation in ferromagnetic materials. (P10, P16, Ni)

29-P. (German.) **A Relation Between the Hall Effect and the Increase of the Electrical Resistance of Bismuth at Low Temperature.** Leopold Halpern. *Zeitschrift für Physik,* v. 133, 1952, p. 524-527.

Polycrystalline bismuth at the temperature of liquid air reveals a simple relationship between the Hall constant, magnetic field strength, and resistance. Tabulated data.

(P15, Bi)

30-P. (Book—German.) **(Developments in Solid State Chemistry.) Einführung in die Festkörperchemie.** J. Arvid Hedvall. 292 pages. 1952. Friedr. Vieweg & Sohn, Braunschweig, Germany. 18.20 DM.

Deals with bond types of solids, defect-type lattices, diffusion, electrical conductivity, sintering, decomposition, transformation, exchange reactions, effects of magnetic fields, light, supersonic waves and gaseous atmosphere on reactivity, and applications to practical problems. Includes 25 pages of tables. Those interested in slag-metal equilibria or powder metallurgy will find much useful information not yet widely known. (From review in *Metallurgical Abstracts)*

(P general, N general, H general)

31-P. (Book—German.) **(Fundamentals of Metallurgy. Vol. 8. Treatise on Extractive Metallurgy.) Grundlagen der Metallurgie. Band 8. Die Metallhüttenpraxis in Einzeldarstellungen.** Ch. K. Avetisian. 242 pages. 1951. Verlag Wilhelm Knapp, Halle (Saale), Germany. (Translated from the Russian by Friedrich Krantz). Paperbound, 12; Clothbound, 14 DM.

Concerned primarily with physical-chemical bases of important metallurgical processes, and their use in understanding of such processes and solution of metallurgical problems. Part 2 deals with metallic state, allotropy, melting of metals, and phase equilibria. Part 3 discusses properties and behaviour of gases in relation to drying of ores and concentrates. Part 4 considers chemical processes in metallurgy, beginning with thermochemistry and law of mass action. Part 5 deals with fundamental principles of hydrometallurgical processes. (From review in *Metallurgical Abstracts)* (P12, C general, D general, N general)

32-P. (Book.) **Liquid-Metals Handbook.** Ed. 2. 270 pages. Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C. $1.00.

Reference information on liquid metals as heat-transfer media. (P11)

33-P. (Book.) **The Thermodynamics of the Steady State.** K. G. Denbigh. 103 pages. 1951. Methuen & Co., Ltd., London. 6 s., 6 d.

A pocket-sized monograph comprising introduction plus chapters on: The Thomson Hypothesis Applied to Thermal Migration Phenomena; Onsager's Theory; Rate of the Entropy Increase in Natural Processes; Some Applications of the Theory; Thermal Migration, Diffusion, Potential, etc.; and Thomson's Hypothesis in Relation to the Theory of Onsager. (P12)

34-P. (Book.) **Valence.** C. A. Coulson. 1952. 338 pages. Oxford University Press, 114 Fifth Ave., New York 11, N. Y.; or Amen House, Warwick Sq., London E.C. 4, England. $5.00.

The viewpoint is quantum-mechanical throughout, using both the molecular-orbitol and valence-bond approaches, making it the most nearly complete treatment available on the subject. Conclusions are logical and not arbitrary. No great demands are made on the mathematical prowess of the reader. (From review in *Journal of the American Chemical Society)* (P10)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

1-Q. The Behaviour of Beams in Bending. S. S. Gill. *Aircraft Engineering,* v. 24, Nov. 1952, p. 336-343.

Experiments carried out on beams in pure bending using cast Mg alloy AZ855. Beam sections were rectangular, circular, I-section, T-section, and diamond. One series of tests was carried out up to 1½% fiber strain, and a second series up to fracture. Tension and compression tests were also made. Diagrams, photographs, and graphs. 11 ref. (Q5, Mg)

2-Q. The Saunders-Roe Technograph Foil Strain Gauge. A New Type of Gauge Which May Solve Many Problems. *Aircraft Engineering,* v. 24, Nov. 1952, p. 348.

It is claimed that these gages are more satisfactory for dynamic tests than wire strain gages. (Q25)

3-Q. Bending Strength of Corrugated Plate. J. B. Caldwell. *Engineering,* v. 174, Nov. 7, 1952, p. 609-612.

Reviews previous investigations, and discusses more fully some features of the behavior of steel and Al alloy corrugated sheets under bending conditions. Only straight-line troughs of trapezoidal or triangular form are considered. Diagrams and graphs. (Q5, CN, Al)

4-Q. Aid for the High-Temperature Designer. James Miller. *General Electric Review,* v. 55, Nov. 1952, p. 51-53.

How rupture characteristics of a metal can be graphically represented in a single curve. (Q4, Sg-h)

5-Q. Hot-Cold Work Improves 16-25-6 Properties. M. Fleischmann. *Iron Age,* v. 170, Nov. 20, 1952, p. 123-127.

Jet engines offer a wider field for application of the 16-25-6 Cr-Ni-Mo alloy steel developed during World War II for gas turbines and turbo superchargers. Creep tests at 10,000 hr. and above were conducted with varying heat treatments including water quenching, hot rolling, and hot-cold working. Graphs, diagrams, and micrographs.

(Q3, J general, AY, SS)

6-Q. Stress-Rupture Characteristics of Unalloyed Titanium Plotted. F. B. Cuff, Jr., and N. J. Grant. *Iron Age,* v. 170, Nov. 20, 1952, p. 134-139.

Describes tests. Tables, graphs, and micrographs. (Q4, Ti)

7-Q. Fatigue Life of Wing Components for Civil Aircraft. Keri Williams. *Journal of the Royal Aeronautical Society,* v. 56, Nov. 1952, p. 842-848.

Three phases of investigation include fatigue tests, load frequencies, and correlation of test results and load frequencies. (Q7)

8-Q. Plastic Deformation of Germanium and Silicon. C. J. Gallagher. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 721-722.

Single crystals of Ge and Si were plastically deformed at elevated temperatures. Ge becomes ductile above 500° C., and Si requires a temperature above 900° C. At temperatures below 600° C., Ge exhibits an induction period at constant load. Graph and micrographs.

(Q23, Ge, Si)

9-Q. The Plasticity of Silicon and Germanium. Frederick Seitz. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 722-724.

Qualitative analysis of Gallagher's measurements of plasticity. Analogy between Gallagher's measurement and those of Kramer and Maddin on β-brass. (Q23, Si, Ge)

10-Q. Anelastic Measurements of Atomic Mobility in Substitutional Solid Solutions. A. S. Nowick. *Physical Review,* ser. 2, v. 88, Nov. 15, 1952, p. 925-934.

A recently developed method for obtaining atomic mobility in solid solutions from rate of anelastic relaxation makes possible measurement of mobilities at temperatures far below those at which conventional diffusion experiments can be carried out. Shows that anelastic effects obtained in substitutional solid solutions are due to stress-induced ordering and that relaxation rate is determined primarily by rate of movement of slower atomic species. Method was applied to Ag-rich Zn solid solutions and relaxation time measured as a function of temperature and concentration. Graphs. 27 ref. (Q22, Ag)

11-Q. The Effect of Grip on the Fatigue Strength of Riveted and Bolted Joints. Frank Baron and Edward W. Larson, Jr. *American Railway Engineering Association Bulletin,* v. 54, Sept.-Oct. 1952, p. 175-190.

Effect of clamping force, degree of hole-filling, and length of grip on the fatigue strength of riveted steel joints. Tables and graphs.

(Q7, K13, CN)

12-Q. The Ductility of Metals in Creep-Rupture Tests. H. H. Bleakney. *Canadian Journal of Technology,* v. 30, Dec. 1952, p. 340-351.

Evidence to show that impurities in commercially pure metals are most common cause of brittle intercrystalline cracking which is characteristic of such materials in creep-rupture tests. Results of tests on Cu, Al, and Ag, and work on Pb and Fe, indicate decreased embrittlement, in creep-rupture tests, with increasing purity of metal. Graphs and tables. 14 ref.

(Q3, Cu, Al, Ag, Pb, Fe)

13-Q. How Much Combined Stress Can a Rivet Take? T. R. Higgins and W. H. Munse. *Engineering News-Record,* v. 149, Dec. 4, 1952, p. 40-42.

Tests on steel rivets. Graphs and tables. (Q23, K13, ST)

14-Q. The Ferrometer, an Apparatus for Testing the Quality of Steel. I. Svensson. *Engineers' Digest,* v. 13, Nov. 1952, p. 393-394, 398. (Translated and condensed from *Ericsson Review,* no. 2, 1952, p. 49-53.)

Application to hardness determination, tempering, conversion of martensite and residual austenite, fault detection, and mechanical load tests. (Q29, Q27, S13, ST)

15-Q. Creep of Copper Under Deuteron Bombardment. Warren F. Witzig. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1263-1266.

Investigation using the 16-Mev. external beam of the University of Pittsburgh cyclotron. Measurements were made of 2nd-stage creep rate of a Cu wire under deuteron bombardment at 260° C. and a loading of 10,000 psi. Tables and graphs. (Q3, P10, Cu)

16-Q. Structural Behavior in Ships at Sea. E. A. Wright and John Vasta. *Journal of the American Society of Naval Engineers,* v. 64, Nov. 1952, p. 693-706.

Reviews past efforts at observations of ship structures and draws tentative conclusions from data presently available. Elements of the problem, development of instrumentation, observations at sea, and future work. Graphs, diagrams, and photographs. 20 ref. (Q23, CN)

17-Q. On the Foot-Hills of the Plastic Range. H. W. Swift. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 109-120.

Present state of knowledge and the extent research is able to make its contribution to various technological processes involving plastic deformation. Suggests the most profitable directions of inquiry appropriate to mathematicians, metal physicists, and engineers. An appeal is made to the metal physicist for a more realistic model of lattice structure, and for a systematic study of stress-strain relations on a wider front than heretofore. Diagrams and graphs. (Q24)

18-Q. The Embrittlement of Copper-Antimony Alloys at Low Temperatures. D. McLean. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 121-123.

Results of V-notch Charpy tests carried out from +100 to −253° C. on slowly cooled Cu alloys containing up to 1.3% Sb. (Q23, Cu)

19-Q. Crystal Slip in Aluminium During Creep. D. McLean. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 133-144.

A study was made of types of slip bands formed in pure polycrystalline Al undergoing creep at 200° C. Two types of slip bands were observed: prominent slip bands of about ¾ μ displacement spaced about 30 μ apart, and fine slips lines of about 50-500 A displacement and spaced less than 1 μ apart which filled interspaces between the former. Results are discussed in terms of dislocation theory. Data are charted. 18 ref. (Q3, Q24, Al)

20-Q. Plastic Deformation of Coarse-Grained Aluminum. V. M. Urie and H. L. Wain. *Journal of the Institute of Metals,* v. 81, Nov. 1952, p. 153-159.

A fine grid, photographically reproduced on the specimen surface, was used to measure local elongations in individual grains of coarse-grained Al. Data are charted. 19 ref. (Q24, Al)

21-Q. Stress-Rupture and Creep Testing of Brittle Materials. W. A. Maxwell and Paul F. Sikora. *Metal Progress,* v. 62, Nov. 1952, p. 97-99.

A convenient method for stress-rupture tests of brittle materials. Inconel "X" was used for grips. Limitations and advantages. (Q3, Q4, T5, Ni)

22-Q. Titanium Sticks to Indenter. H. P. Leighly, Jr. and H. L. Walker. *Metal Progress,* v. 62, Nov. 1952, p. 109.

Difficulty of making hardness tests of Ti. (Q29, Ti)

23-Q. The Influence of Aluminium and of Various Heat Treatments on the Creep Properties of Low Carbon Steel Superheater Tubes. D. C. Herbert and E. A. Jenkinson. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 69, Nov. 1952, p. 27-44.

Creep properties of three low-carbon steels having 1, 2, and 3 lb. per ton of added Al respectively were determined in creep tests at 8 tons per sq. in. and 450° C. Tests were made on samples of tubes at various stages of manufacture, and after further reduction, either hot or cold. Some samples were subjected to one of various commercial annealing treatments before testing. Tables, graphs, and photomicrographs. (Q3, CN)

24-Q. A Theory of Work-Hardening of Metal Crystals. N. F. Mott. *Philosophical Magazine,* ser. 7, v. 43, Nov. 1952, p. 1151-1178.

Theory based on properties of dislocations. Diagrams. 41 ref. (Q24)

25-Q. Critical Shear Stress and Temperature. E. N. Da C. Andrade. *Philosophical Magazine,* ser. 7, v. 43, Nov. 1952, p. 1218-1221.

Considers above with reference to Bi, Zn, Cd, Cu, Mg, Ag, Au, Pb, and Hg. Graphs. 12 ref. (Q2)

26-Q. Strand Wire Ropes *Wire Industry,* v. 19, Nov. 1952, p. 1030, 1033.

Factors which influence the life of a rope, including effects of bending, size of pulleys and drums, and wear distribution. (Q9, ST)

27-Q. (French.) **Application of the Principle of Increasing the Yield Point of Steels by Cold Working and Artificial Aging to the Design of Reinforced Conduits; Resulting Economic Advantages.** Georges Ferrand. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Loeben,* v. 97, Oct. 1952, p. 192-201.

Tabulated data show that cold working followed by artificial aging increases the strength properties of steels. Diagrams and photographs. (Q23, Q24, ST)

28-Q. (French.) **The Resistance to Heat of Light Alloys.** Jacques Valeur. *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 339-346. (Based on paper by Raymond Chevigny and Robert Syre.)

Mechanical properties of light alloys at temperatures from 480 to 575° F. Influence of composition, conditions of production of the metal, grain size, duration of preheating, heat treatments, loading conditions, and galvanic coatings were studied. Tables. (Q general, N3, J general, L16, Al, Mg)

29-Q (German.) **Properties of Soft Steels Blown With Oxygen-Steam Mixtures.** Alfred Krüger. *Stahl und Eisen,* v. 72, Nov. 6, 1952, p. 1426-1433.

Statistical analysis of C, Mn, P, S, and N_2 contents of 109 steels having poor N_2 contents, refined in a 2-ton converter with O_2 and steam in varying proportions. Effects of notched bar impact strength after aging, tensile strength, cold deformation, and deep drawing tests of sheets. Metallographic examination. Graphs. 19 ref. (Q23, Q6, D2, ST)

30-Q. (German.) **Investigations on the Replacement of Alloy Metals by Boron in Case Hardening and Heat Treating Steels.** Robert Scherer, Karl Bungardt, and Ernst Kunze. *Stahl und Eisen,* v. 72, Nov. 6, 1952, p. 1433-1442.

Tests with Cr-Mn and Cr-Ni steels of the case hardening type to determine effect of boron on hardness penetration and notched-bar impact strength of disks; and heat treating tests on Mn-Si, Cr-Mo, and Cr-Va steels with and without boron, to determine properties after quenching and tempering at different temperatures. Tables and graphs. (Q29, Q6, J28, AY)

31-Q. (Russian.) **Tensile Fracture During Compression of Brittle Quasi-Isotropic Polycrystals.** S. D. Volkov. *Doklady Akademii Nauk SSSR,* v. 85, Aug. 11, 1952, p. 967-970.

Theoretical proof. Includes diagrams. (Q28)

32-Q. (Russian.) **Microhardness of Borides and Nitrides of Refractory Metals.** G. V. Samsonov. *Doklady Akademii Nauk SSSR,* v. 86, Sept. 11, 1952, p. 329-332.

Borides of Ti, Zr, V, Cb, Ta, Cr, and W, and nitrides of Ti, Zr, and Ta were investigated. Data are tabulated and discussed. (Q29)

33-Q. (Russian.) **The Problem of Wear Resistance of Diffused Chromium Coatings.** N. S. Gorbunov and V. P. Lazarev. *Doklady Akademii Nauk SSSR.* v. 86, Sept. 11, 1952, p. 345-347.

The wear resistance and microhardness of hot-chromized iron specimens were studied. Wear testing apparatus. Data are tabulated and charted. (Q9, Q29, Fe, Cr)

34-Q. Flexural Fatigue Strength of Anodized 24-ST Aluminum-Alloy Sheet. Charles B. Cliett. *Aeronautical Engineering Review,* v. 11, Dec. 1952, p. 29-30, 42.

Results of investigation. Conclusion is drawn that anodizing reduces life of Al alloy when subjected to fatigue conditions and to combined action of corrosion and fatigue. Graphs and diagrams. (Q7, R1, L19, Al)

35-Q. High Temperature Alloys for Gas Turbines. H. V. Kinsey. *Canadian Metals,* v. 15, Oct. 1952, p. 28, 30.

Reviews requirements and tabulates information on tensile strength and on creep and rupture properties at elevated temperatures. (To be concluded.) (Q27, Q3, T25, SG-b)

36-Q. Mechanism of Work-Hardening of Metals. N. F. Mott. *Engineer,* v. 194, Nov. 21, 1952, p. 694-697.

The origin of slip lines, reason for clustering and cause of work hardening. Two conceptions used in discussion are dislocation line and vacant lattice site. (Q24)

37-Q. Stress and Plastic Strain Relations of a Magnesium Alloy. A. E. Johnson and N. E. Frost. *Engineer,* v. 194, Nov. 28, 1952, p. 713-719.

Tests made under complex stress systems on a nominally isotropic Mg alloy at temperatures between 20 and 150° C. Graphs. (Q25, Mg)

38-Q. High Temperature Metals. Albert E. White. *Industrial Heating,* v. 19, Oct. 1952, p. 1862-1864, 1866, 1870.

Determination of mechanical properties, operating temperatures and pressures of various metals and alloys, particularly Cr-Mo steel for use at elevated temperatures in power, petroleum, automotive, and aviation industries. Graphs. (To be continued. (Q general, AY, SG-h)

39-Q. Scabbing of Metals Under Explosive Attack: Multiple Scabbing. John S. Rinehart. *Journal of Applied Physics,* v. 23, Nov. 1952, p. 1229-1233.

Mechanics of the generation of multiple scales. Experimentally obtained stress data are used as basis for discussion. Graphs, diagrams, and photographs. (Q25)

40-Q. Cast Iron With the Properties of Steel. *Railway Mechanical and Electrical Engineer,* v. 126, Dec. 1952, p. 68-69.

A ductile cast iron, developed by International Nickel Co., in which Mg is used to spheroidize the car-

bon. Mechanical properties are charted. (Q general, CI)

41-Q. (German.) **The Shape Retention of Structural Parts.** Cord Petersen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Oct. 21, 1952, p. 977-982.

Theoretical discussion and review of literature advances the idea that it should be possible to find a substitute bar for every structural part whose alternating fatigue strength is the same as that for a structural part and which can be used to compute the strength properties of similar structural parts of different size and different steels. Tables, graphs, and diagrams. 18 ref. (Q7, ST)

42-Q. (Italian.) **Advantages of the "Tukon" Microhardness Tester in Metallography.** D. Gualandi. *Alluminio,* v. 21, Nov. 1952, p. 463-471.

The real nature of hardness and the principle and use of the Tukon tester. Micrographs, photographs, and diagrams. 11 ref. (Q29, M23)

43-Q. (Italian.) **Experimental and Theoretical Investigations on Al-Mg-Si Alloy for 24 Liter Capacity Liquid Gas Cylinders.** F. Gatto. *Alluminio,* v. 21, Nov. 1952, p. 481-503.

Results of deformation and explosion tests of 30 cylinders made of the above alloys. Tables, photographs, diagrams, and charts. 16 ref. (Q23, Al)

44-Q. (Book.) **Elasticity in Engineering.** Ernest E. Sechler. 419 pages. 1952. John Wiley & Sons, 440 Fourth Ave., New York 16. $8.50.

Fundamental equations and assumptions underlying the field of elasticity; and elastic problems of stable structures. Shows where exact solutions are possible and deals with similar problems of unstable elastic structures. (Q21)

45-Q. (Book.) **Fatigue and Fracture of Metals.** 313 pages. 1952. William M. Murray, editor. Technology Press, Massachusetts Institute of Technology; and John Wiley and Sons, 440 Fourth Ave., New York 16, N. Y. $6.00.

Includes 14 papers given at a conference at MIT in June 1950. Topics covered are: general experiences with metal failures; specific fields of occurrence; probable internal mechanisms of fatigue; metallurgical fatigue phenomena; and research. (Q7, Q26)

46-Q. (Book.) **Weight-Strength Analysis of Aircraft Structures.** F. R. Shanley. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $8.50.

Basic methods for determining minimum weight values for aircraft, and proper application of these values. Concludes with a number of special reports on weight considerations for new materials and extreme operating conditions. (Q23, T24)

R

CORROSION

1-R. New Copper Alloy Has High Stress-Corrosion Resistance. C. H. Hannon. *Iron Age,* v. 170, Nov. 20, 1952, p. 131-133.

New Cu-base Cu-Ni-Si alloy shows high resistance to stress-corrosion failure. Addition of critical amounts of Fe gave improved properties. While excellent properties were found in sand cast and hot-forged parts, highest mechanical properties were developed by successive solution and aging heat treatments. (R1, Cu)

2-R. How to Cut Corrosion Losses With Magnesium Anodes. R. D. Taylor. *Modern Metals,* v. 8, Nov. 1952, p. 49-51.

Use of Mg anodes to take burden of natural galvanic corrosion and leave other metals relatively untouched. (R10, Mg)

3-R. Corrosion Prevention in Hot Water Storage Tanks. R. F. Walker. *Ontario Hydro Research News,* v. 4, July-Sept. 1952, p. 13-16.

Corrosion can be mitigated either mechanically by insulating metal with a protective coating or electrically by providing cathodic protection. Latter can be applied by use of an external source of direct current that increases the negative potential of the object to be protected in relation to its surroundings; or by formation of a galvanic cell that utilizes a metal high in the electromotive series such as an expendable Mg anode. Photographs. (R4, Mg)

4-R. The Use of Graphite Anodes for Cathodic Protection of the Bottoms of Inactivated Ships. J. P. Oliver. *Applications and Industry,* Nov. 1952, p. 324-329.

Some technical problems involved in investigations. Economy afforded by use of cathodic protection. Tables and graphs. (R10, CN)

5-R. Measurement of Cathodic Protection Currents From Sacrificial Anodes. H. N. Hayward and R. M. Wainwright. *Applications and Industry,* Nov. 1952, p. 350-352.

Brief description. Diagrams. (R10)

6-R. Aluminum Foil Protects Aircraft Parts. *Canadian Metals,* v. 15, Nov. 1952, p. 48.

Use of Al foil for corrosion protection of steel parts. (R10, Al, ST)

7-R. Uniform Test Procedures Evaluate Corrosion Resistance of Titanium. G. C. Kiefer. *Iron Age,* v. 170, Dec. 4, 1952, p. 170-173.

Unalloyed Ti 75A titanium sheet was found far superior to most common metals in resistance to chemical pitting. Corrosion tests were run in many media. In boiling HNO_3 and room-temperature HCl, Ti is better than stainless but in concentrated H_2SO_4 or H_3PO_4, stainless is more resistant. In organic acids, both metals behave similarly. Data are tabulated. (R5, R11, Ti, SS)

8-R. Thermogalvanic Potentials. Nickel in Neutral Sulfate Solution. Dodd S. Carr and Charles F. Bonilla. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 475-482.

Investigation to prepare reproducible Ni electrodes and to measure their thermogalvanic effects. Includes summaries of previous investigations. Extensive tables. 56 ref. (R1, Ni)

9-R. Effect of Stress on Metal Electrode Potentials. Robert E. Fryxell and Norman H. Nachtrieb. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 495-503.

Study on Ag and Au electrodes to obtain fundamental information relevant to stress-corrosion phenomena and to the problems of preparing reproducible and stable metal electrodes for laboratory use. Diagrams, tables, and micrographs. 11 ref. (R1, Ag, Au)

10-R. Anodic Behavior of Iron in H_2SO_4. J. H. Bartlett and Lee Stephenson. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 504-512.

The steady state characteristics of the cell Fe H_2SO_4 (aq) Pt, on observations of the anode surface with the aid of a microscope, and on the behavior of the cell current after it has been interrupted for a short time (less than 0.02 to 0.03 sec.). Graphs and tables. 17 ref. (R1, Fe)

11-R. The Nature of the Films Formed by Passivation of Iron With Solutions of Sodium Phosphate. M. J. Pryor, M. Cohen, and F. Brown. *Journal of the Electrochemical Society,* v. 99, Dec. 1952, p. 542-545.

Study in which weights of ferric phosphate present in films formed by the passivation of iron in 0.1M solutions of disodium and trisodium phosphate were determined using a radioactive tracer, and the thickness of oxide was estimated by an electrochemical method. (R10, Fe)

12-R. An Air-Cooled Metal Probe for the Investigation of the Corrosive Nature of Boiler Flue Gases. G. G. Thurlow. *Journal of the Institute of Fuel,* v. 25, Nov. 1952, p. 252-255, 260.

Investigtaion applied to carbon steel. Results obtained indicate that there is a general relationship between weight of acid condensed and quantity of iron corroded and also that a peak occurs in rate of corrosion some 50-100° F. below acid dew-point. Tables and graphs. 10 ref. (R9, R11, CN)

13-R. Some Problems Associated With Lubrication of Large Engines. *Lubrication,* v. 38, Nov. 1952, p. 137-148.

Cylinder lubricators and bearing corrosion. Tabulated information on corrosion properties and bearing materials. Crankcase explosions, engine deposits, and engine wear. Tables, photographs, and micrographs. (R7, Q9, SG-c)

14-R. Lower Oxides of Titanium. A. E. Jenkins. *Metal Progress,* v. 62, Nov. 1952, p. 108-109.

Formation of $TiO_{1.3}$ and $TiO_{1.8}$ during an investigation of the high-temperature oxidation of the Ti and its alloys. (R2, Ti)

15-R. Here's a New Method of Inhibiting Corrosive Wells. J. R. Marshall. *Oil and Gas Journal,* v. 51, Dec. 8, 1952, p. 105.

Device for injecting inhibitors into wells. Diagrams. (R10)

16-R. Digester Corrosion Measurement. Nicholas Shoumatoff. *Tappi,* v. 35, Nov. 1952, p. 494-499.

Data on sequential wall-thickness measurements, with particular emphasis on quantitative analysis of the data, as an illustration of the study of corrosion in a typical sulfate-pulp digester. Investigation was made of validity of inspection procedure with Audigage thickness tester, of local variations of thickness and corrosion within the vessel, and of best means for interpreting routine inspection data. Tables. (R11, CN)

17-R. Pumping Well Service Costs Cut by Corrosion Control. Bryant W. Bradley. *World Oil,* v. 135, Dec. 1952, p. 214, 216, 218, 226.

Corrosion control measures in sweet and sour oil wells. (R10)

18-R. Prevention of Corrosion in Cooling Water. R. C. Ulmer and J. W. Wood. *Corrosion,* (Technical Section), v. 8, Dec. 1952, p. 402-406.

General considerations involved in reducing corrosion by several types of cooling water systems. Treatments include pH control, addition of anti-biologicals, insulation to stop stray current corrosion, and oxygen removal. Information on laboratory research on inhibitors by Drew Co. Charts, diagrams, and tables. (R10, R4, CN, Cu)

19-R. Soil Resistivity Measurements for Corrosion Control. F. O. Waters. *Corrosion,* (Technical Section), v. 8, Dec. 1952, p. 407-409.

Results of experiments to determine most practical soil survey procedure and best equipment. Several types of equipment for determining soil resistivity with good and bad points of each. Rules for interpretations of results, and use of soil resistivity determinations indicative to types of coating. (R8)

20-R. The Inhibition of Sodium Trichloroacetate Weed Killer Solutions. F. N. Alquist and J. L. Wasco.

Corrosion, (Technical Section), v. 8, Dec. 1952, p. 410-412.

Addition of small amounts of $Na_2Cr_2O_7$ to sodium trichloroacetate was found to inhibit corrosiveness on various metals. Presence of an oil layer at air-liquid interphase prevents much of the liquid-level corrosion. Data for action on steels, Al, and brass are tabulated. (R10, ST, Al, Cu)

21-R. Effect of Titanium in Galvanic Corrosion. Henry Paige and Sara J. Ketcham. *Corrosion* (Technical Section), v. 8, Dec. 1952, p. 413-416.

A series of laboratory tests was performed in which various metals were coupled to either stainless steel or Ti in normal NaCl. Data indicate that electrochemical behavior of Ti and stainless steel is similar under test conditions. Mechanical testing of heat treated specimens reveals that exposure to oxidizing conditions above 1000° F. has a deleterious effect on ductility of Ti as well as its resistance to stress-corrosion conditions. (R1, Q23, Ti, SS)

22-R. Corrosion of Carbon Steel in Gas Processing Plants. D. E. McFaddin. *Gas,* v. 28, Dec. 1952, p. 105-106.

Reactiveness of CO_2 and H_2S in gas processing plants. Preventative measures such as protective films. Stress-corrosion. (R9, L general, CN)

23-R. The Corrosion Resistance of Electrodeposited Tin-Nickel Alloy. S. C. Britton and R. M. Angles. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, p. 293-322. (Preprint.)

Tests carried out with electrodeposits of Sn-Ni alloy (65% tin) using exposure to natural and simulated atmospheres for deposits up to 0.001 in. thick and using a wide variety of agents for thick porefree coatings. Alloy is cathodic to steel and brass. Tables. 10 ref. (R11, L17, Sn, Ni)

24-R. Corrosion of Galvanized Steel in Soils. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards,* v. 49, Nov. 1952, p. 299-314.

Measurements of corrosion of galvanized steel and of bare steel and Zn as reference materials after exposure to different soil conditions for a maximum of 13 years. From analysis of data on corrosion of galvanized specimens having different weights of coating, minimum coating requirements for different environmental conditions are suggested. Tables, photographs, and graphs. (R8, L16, ST, Zn)

25-R. Corrosion of Low-Alloy Irons and Steels in Soils. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards,* v. 49, Nov. 1952, p. 315-324.

Measurements of corrosion of ten low-alloy irons and steels exposed to 14 soils for periods up to 13 years. Magnitude and progress of corrosion as determined by weight-loss and pit-depth measurements are correlated with composition of materials and nature of environmental conditions to which test specimens were exposed. Photographs, tables, graphs. (R8, AY)

26-R. Corrosion Proofing Grumman War Planes. Frank L. Bonem. *Products Finishing,* v. 17, Dec. 1952, p. 24-32, 34, 36, 38.

How Grumman meets Navy specifications for corrosion proofing. (R10, L general)

27-R. (Book—French.) **(Introduction to the Study of Metallic Corrosion in the Petroleum and Chemical Industries.) Introduction a l'Etude de la Corrosion Métallique dans les Industries Pétrolieres et Chimiques.** M. Ballay, J. Bénard, G. Chaudron, J. Duflot, P. Lacombe, and A. Portevin. 219 pages. 1952. Societe d'Edition d'Enseignement Superieur, 99 Boulevard St. Michel, Paris. 1750 Fr.

Lectures and practical work which formed a course on corrosion phenomena. General discussion on principles of corrosion and on the protection of metals; relationship between corrosion and surface condition; corrosion testing; chemical and electrochemical corrosion; intercrystalline corrosion and stress-corrosion; application of electrochemical theory to prevention of corrosion; pickling of iron and steel; corrosion of metals and alloys by gases at elevated temperatures, resistance of Ni and its alloys to corrosion; and use of stainless steels in the petroleum industry. (R general)

28-R. (Book.) **A Manual on Underground Corrosion.** 37 pages. Columbia Gas System Corp., 79 N. 3rd St., Columbus 15, Ohio. 75c.

A roundup of latest information on corrosion causes and corrective measures, illustrated with line drawings. Written so layman can understand. (From review in **Iron age**) (R8)

S

INSPECTION AND CONTROL

1-S. Some Problems in the Analysis of Steels by X-Ray Fluorescence. E. Gillam and H. T. Heal. *British Journal of Applied Physics,* v. 3, Nov. 1952, p. 353-358.

Measurement of proportion of elements of atomic numbers higher than 20 in steels by X-ray fluorescence using a Geiger-counter spectrometer was investigated, primarily to determine suitability as a rapid means of analysis during steelmaking, particularly for high-alloy steels. Possible improvements. Appendix gives theory of the method. Graphs and diagrams. (S11, SS)

2-S. New Flaw-Detecting Ink. *Chemical Age,* v. 67, Nov. 8, 1952, p. 637.

Use of special ink and ultraviolet light reveals cracks and internal flaws in ferrous metals. (S13, Fe)

3-S. Inwall Temperatures of Blast Furnaces. Samuel J. Paisley. *Instruments,* v. 25, Nov. 1952, p. 1571, 1610, 1612.

Use and placement of thermocouples. (S16, D1)

4-S. Gage Blocks: New System Widens Applications. *Steel,* v. 131, Nov. 24, 1952, p. 98-101.

Details of system which speeds up construction of gaging setups. Units were developed by DoAll Co., Des Plaines, Ill. Diagrams and illustrations. (S14)

5-S. What's Ahead the Next Ten Years in Inspection and Testing. *American Machinist,* v. 96, Mid-Nov. 1952, p. 1-19.

Instrumentation in general, gaging methods, quality control, metallurgical control of invisible defects, X-ray techniques, and statistical techniques. (S general)

6-S. Mechanical-Metallurgical Problems Associated With Mine Drilling Operations. T. W. Wlodek. *Canadian Mining and Metallurgical Bulletin,* v. 45, Nov. 1952, p. 651-657; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 377-383.

Laboratory methods now employed for simulated service testing of tungsten carbide bits, conical push-on and threaded types of attachments, drill rods, and shank ends. Objectives of research program now being carried out. A number of mines were visited. Mechanical-metallurgical problems most frequently encountered and discussed during these visits. Diagrams, graphs, and illustrations. (S21, T28, W, C-n, [illegible])

7-S. Gamma Radiography in the Foundry. R. J. Hart. *Foundry,* v. 93, Nov. 20, 1952, p. 583-588.

Advantages of radiography for routine inspection of castings, using radioactive isotopes. Includes exposure charts and photographs of setups. (S13, CI)

8-S. Inspection Techniques for Quality Welding. William B. Bunn. *Industry & Welding,* v. 25, Dec. 1952, p. 66-68, 70-71, 73-74.

Codes and specifications; visual X-ray, betatron and Co^{60} methods of inspection. (To be concluded.) (S13, S22, K9)

9-S. Precision Inspection Checks Engine Components Rapidly, Accurately. Herbert Chase. *Iron Age,* v. 170, Nov. 27, 1952, p. 117-119.

Air gages play an important part in insuring quick and precise measurements of engine components in Ford's Cleveland plant. The latest type of dynamic crankshaft-balancing equipment is used. (S14)

10-S. Gear Measuring Equipment Used by the Bureau of Ships, U. S. Navy. John W. Sawyer. *Journal of the American Society of Naval Engineers,* v. 64, Nov. 1952, p. 719-731.

Instruments now used for gear inspection at the Naval Boiler and Turbine Laboratory, Philadelphia, and the Engineering Experiment Station, Annapolis. (S14)

11-S. Determination of Oxygen in Iron in the Presence of Sulphur by the Vacuum-Fusion Method. H. L. Hammer and R. M. Fowler. *Journal of Metals,* v. 4, Dec. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, Dec. 1952, p. 1313-1315.

Ways of overcoming various difficulties encountered at Union Carbide and Carbon Research Laboratories, Inc. (S11)

12-S. A Versatile Equipment for Thermocouple Switching Using a Post Office Type Uniselector. H. Burton and S. F. Suffolk. *Journal of Scientific Instruments,* v. 29, Nov. 1952, p. 350-352.

Errors encountered in use, and methods of overcoming these errors. Details of a switching unit to connect up to 50 thermocouples in succession to either an indicator or a recorder. Diagrams and graphs. (S16)

13-S. Black Light Spots Defects in Materials. N. E. Walters. *Materials & Methods,* v. 36, Nov. 1952, p. 105-107.

Nondestructive inspection of metals and nonmetals by fluorescent methods. (S13)

14-S. Standard Carbon Steels; Chemical Composition Limits. *Metal Progress,* v. 62, Nov. 1952, p. 96B.

A data sheet. (S22, CN)

15-S. Magnetic Particle Weld Inspection. Gilbert C. Close. *Modern Machine Shop,* v. 25, Dec. 1952, p. 150-152, 154, 156, 158, 160, 162, 164.

Certain principles of the process and how they may be utilized to detect defects in ordinary fusion welds in ferrous materials. Diagrams and photographs. (S13, Fe)

16-S. The Push Button Era Has Reached Gaging. C. W. Kennedy. *Modern Machine Shop,* v. 25, Dec. 1952, p. 198-202, 204, 206, 208, 210, 212, 214.

WESTERN METAL CONGRESS
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Operation and advantages of automatic gages in checking parts. (S14)

17-S. (French.) Metallographic Determination of Temperatures Reached During Operation of Heat Engines. Jean Poulignier, Charlotte Buckle, and Pierre Jacquet. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Oct. 6, 1952, p. 718-720.

Operating temperatures on the surface and in interiors are deduced from colored films forming on the surfaces of Ni-Cr turbo-reactor blades. Results are compared with those deduced from hardness tests. Possibilities of more general application are indicted. Diagrams. (S16)

18-S. (French.) The Principal French AFNOR Specifications for Finished and Semi-Finished Aluminum and Light Alloy Products. *Revue de l'Aluminium,* v. 29, Oct. 1952, p. 375-377.

A list of the specifications. (S22, Al, Mg)

19-S. New System Speeds Construction of Gaging Set-Ups for Any Gaging or Scribing Operation. *Machine and Tool Blue Book,* v. 48, Dec. 1952, p. 170-172, 174, 178, 180, 182, 184-185.

A new series of gaging items developed by DoAll Co., Des Plaines, Ill., which permit more flexibility of gaging setups. (S14)

20-S. Drill Pipe Rejects Show Good Service Life. H. G. Texter. *Petroleum Engineer,* v. 24, Dec. 1952, p. B78, B81-B84, B86-B87.

Three experimental field tests. Results showed what depth or shape of inside seams can be tolerated. Micrographs. (S21, ST)

21-S. An Electrical Roughness Tester for the Workshop. G. W. van Santen. *Philips Technical Review,* v. 14, Sept.-Oct. 1952, p. 80-86.

Instrument consists of two pick-ups, one amplifier, a rectifier, and a moving-coil meter. (S15)

22-S. Some Practical Aspects of Specifying Surface Finishes. Joseph Adiletta. *Product Engineering,* v. 23, Dec. 1952, p. 150-154.

Typical surface conditions of parts prepared by various machining methods and standard designations for them. (S15, G17)

23-S. Vacuum Testing on Production Lines. Lorance E. Sterns. *Tool Engineer,* v. 29, Dec. 1952, p. 60-62.

Equipment for testing tightness of castings, drawn parts, assemblies, etc., using Whittington vacuum producers. Photographs and diagrams. (S general)

24-S. Concentration Tests on Various Base-Metal Ores. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4927, Nov. 1952, 14 pages.

Results of preliminary concentration tests on sample of ore containing the base metals Pb, Zn, Cu, or Sb or more than one of these metals. Tables. (S11, B14, Pb, Sn, Cu, Sb)

25-S. (German.) Sampling Liquid Steel Baths for Oxygen. Karl Georg Speith and Hans vom Ende. *Stahl und Eisen,* v. 72, Nov. 20, 1952, p. 1521-1523.

Report No. 515 of the Steelworks Committee of the Verein Deutscher Eisenhüttenleute. Method and results of tests. Photographs, tables, and charts. 11 ref. (S16, ST)

26-S. (Book.) ASTM Standards on Metallic Electrical Conductors. 252 pages. Sept. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

Conductors for use in uninsulated form or for subsequent use in making insulated conductors. Cu and Cu alloys, Cu-coated steel, Al, and iron and steel are included. (S22, Cu, Al, Fe, ST)

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METALS REVIEW

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T

APPLICATIONS OF METALS IN EQUIPMENT

1-T. Sub-Zero Hand-Tool Failures Suggest New Steels and Treatments. Sam Tour. *American Machinist,* v. 96, Nov. 24, 1952, p. 154-155.

Tabulated information on tests to determine what steels and heat treatments are required for hand tools subjected to extreme cold. Includes impact-strength tests. (T6, Q6, J general, CN, AY)

2-T. Magnesium in Structural Design. D. A. Beck. *Modern Metals,* v. 8, Nov. 1952, p. 66-68, 70.

Rigidity, stresses, and tolerances. Use for skin and advantages of wrought and casting alloys. Extended use of extrusions is expected. (T26, Q23, Mg)

3-T. 67 Forgings Welded Together Form a Diesel Crankcase. *SAE Journal,* v. 60, Nov. 1952, p. 24-25. (Based on paper "Development of a 16 Cylinder, Vertical, Radial Diesel Engine" by Eric R. Brater.)

Production of Cleveland Diesel Model 338 vertical radial engine. (T25, Q25, K general, ST)

4-T. What's Ahead the Next Ten Years in Materials and Components. *American Machinist,* v. 96, Mid-Nov. 1952, p. A2-A21.

Materials and components include construction steels, special coatings, Al, Cu alloys, Mg, Ti, Ni, Zr, Pb, Zn, Sn, Cd, Mo, Si, Be, Th, Hf, In, Li, Na, B, Ga, Ge, Hg, Re, plastics, electrical equipment, power-transmission equipment, hydraulic and pneumatic equipment and lubrication. (T general, A general)

5-T. Putting the Uncommon Metals to Work. Robert I. Jaffe. *Battelle Technical Review,* v. 1, Nov.-Dec. 1952, p. 126-127.

Use of less common metals of Zr, Be, and Mo in nuclear engines; Ti, Mo, and Cr in heat engines; and Ge, Si, Se, W, Ta, and Re in electrical applications. Unique properties. (T25, T1)

6-T. Heat Recovery in Industrial Furnaces. A. Clift and C. Knight. *Journal of the Iron and Steel Institute,* v. 172, Nov. 1952, p. 327-339.

Important features of both direct and other forms of heat recovery in industrial furnaces and possible future developments. Tables, charts, and diagrams. (T5)

7-T. The Use of Castings in Airframe Design. *Metal Progress,* v. 62, Nov. 1952, p. 67-72.

Actual and potential examples. Tensile properties of various Al and Mg casting alloys compared with those of heat treated steels and wrought Al alloys. Recommended designs and molding methods. (T24, Q27, E19, Al, Mg)

8-T. Metals in Radioactive Static Eliminators. J. D. Graves. *Metal Progress,* v. 62, Nov. 1952, p. 94-96.

Nature of the devices, use of various radioactive metals in them, health hazards, and industrial applications. (T8, P13)

9-T. Evaluating and Redesigning Magnesium Truck Wheels. *Modern Metals,* v. 8, Nov. 1952, p. 38-40, 42, 44.

How most efficient design may be accomplished. Results of tensile and stress-coat tests are tabulated. (T21, Q27, S13, Mg)

10-T. More Indium Metal. . .Can You Use It? *Steel,* v. 131, Dec. 8, 1952, p. 98-99.

Present and possible future uses of In, including its alloys with Pb,

Sn, Cd, and Bi. Physical and mechanical properties.
(T general, P general, Q general, In)

11-T. Designers Put More "Sell" Into Ranges With Stainless. W. B. Nixon. *Stove Builder,* v. 17, Dec. 1952, p. 38-41, 88.

Favorable characteristics of Type 430 stainless steel for use on stoves. Recommendations for forming sheets, and for finishing.
(T10, G1, L general, SS)

12-T. Aluminum in the Canning Industry. Obering D. Nickelsen and S. Buschmann. *Aluminium,* v. 28, Nov. 1952, p. 383-391.

As developed in Norway. Fabrication methods, costs, and applications are compared with those of tin plate. Continuous anodizing and composition of Al strip. Photographs and diagrams. (T29, L19, Al)

13-T. All Steel Rotary Hose Made for Work on Portable Rigs. *Drilling,* v. 14, Dec. 1, 1952, p. 123.

New all-steel rotary hose unit developed by Chicksan Co., and its advantages over conventional equipment. (T28, ST)

14-T. Material Specifications for Oil-Film Bearings. E. B. Etchells. **Tired Bearings—Reasons and Remedies.** J. Palsulich. **Role of the Lubricant in Bearing Fatigue.** E. S. Carmichael and R. B. Purdy. *Lubrication Engineering,* v. 8, Dec. 1952, p. 291-297, 312-314, 316.

Selection of metal compositions for various applications in oil-film bearings; factors and functional differences that influence choice of available bearing materials. Composition and construction of sleeve bearings in common use. Comparative resistance to fatigue of various bearing materials in tabular form. How lubricant can minimize fatigue. Tables, graphs, and diagrams. 24 ref. (T7, Q7, SG-c)

15-T. All-Magnesium Car Body. *Metal Industry,* v. 81, Nov. 21, 1952, p. 409-411.

The body is built in sections which are welded together. Details of various sections. (T21, Mg)

16-T. Stainless Steel in the Petroleum Industry. Rolt Hammond. *Petroleum,* v. 15, Dec. 1952, p. 321-325.

Range of stainless steels available to the petroleum technologist. Stresses need for careful appraisement of operating conditions before any particular alloy is selected for any specific purpose. (T29, SS)

17-T. Stainless Steel and Aluminium in the U.S.A. *Petroleum,* v. 15, Dec. 1952, p. 328-330.

Visit to U.S.A. was made by Great Britain Technical Assistance Mission in order to investigate reasons for leading position of U.S. in the chemical and petroleum industries. This part of report deals with uses of stainless steel and aluminum. Tables. (T29, SS, Al)

18-T. Aluminum Parts Cut Weight in Family of Marine Diesel Engines. *Product Engineering,* v. 23, Dec. 1952, p. 144-145.

How Al castings and forgings replace conventional cast iron and steel parts in a family of new lightweight marine diesel engines developed by Packard Motor Co., for U. S. Navy. (T25, Al, CI, ST)

19-T. Corrosion Resistant Alloys. James T. Gow. *Pulp & Paper,* v. 26, Dec. 1952, p. 96, 98, 100, 102.

Fe-Cr alloys, Fe-Cr-Ni alloys, and Ni-base alloys which are used in pulp and paper mills and other corrosive services.
(T29, R general, Fe, Cr, Ni)

20-T. Bridge Features Use of Steel Forms for Concrete Piers. *Railway Engineering and Maintenance,* v. 48, Dec. 1952, p. 1184-1185.

A feature of the new railway bridge now being constructed over the Missouri river near Chamberlain, S. D. (T26, ST)

(*Continued on p.* 46)

EMPLOYMENT SERVICE BUREAU

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METALLURGICAL ENGINEER: B.S. degree, age 24. Three years research experience in fatigue and related problems. Interested in position dealing with fatigue investigations, primarily in high-temperature work. Will soon complete evening classes leading to M.S. degree in metallurgical engineering. Box 1-130.

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